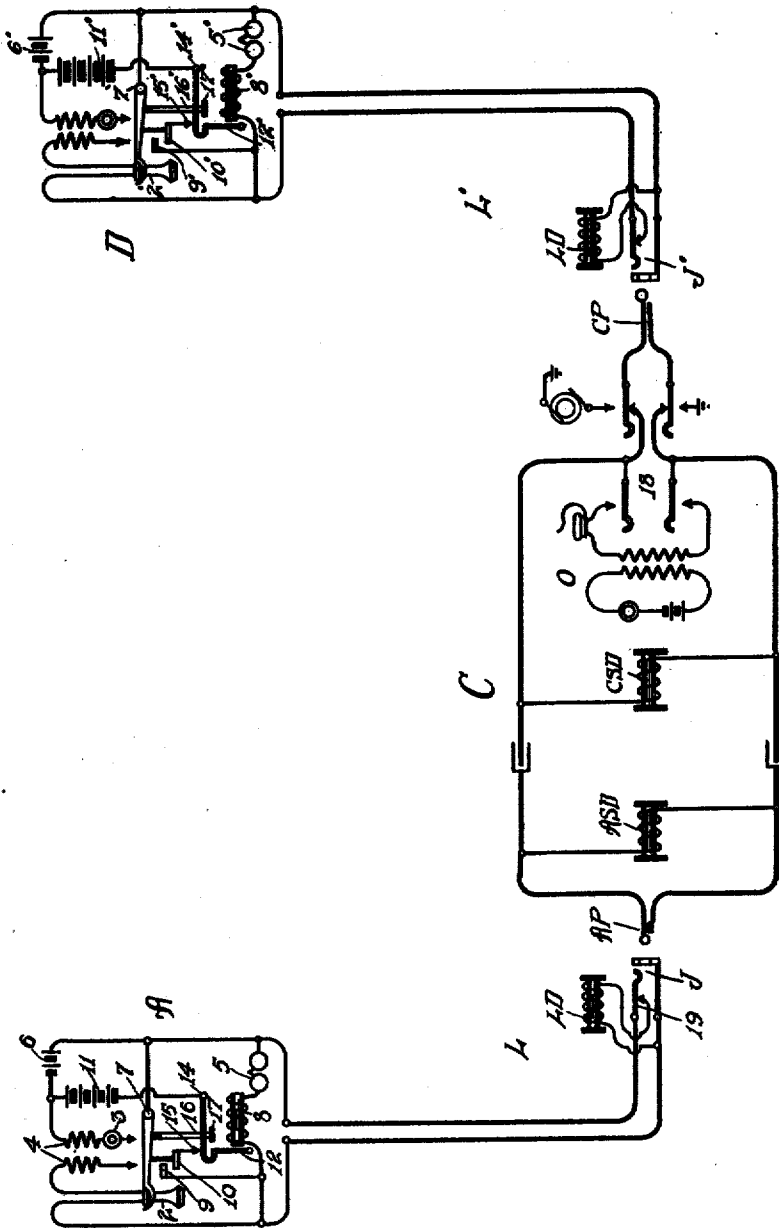


J. S. ALLEN.
TELEPHONE SYSTEM.
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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH S. ALLEN, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephone systems in which link or trunk circuits are employed, and has to do more particularly with manually operated systems in which the line and supervisory signals located at the central office are controlled by local batteries located at the subscriber's substation, and has for its object a novel and improved system of the above type.

In systems of this character local battery is used at the substation for talking purposes, which battery either alone or in conjunction with an additional battery is used through the medium of a passing contact maker for sending a current impulse of a certain time interval to operate suitable signals at the exchange. In systems using apparatus of this kind, it is desirable to send an impulse upon the upward movement of the switch-hook, to operate a line signal to notify the operator that a connection is desired, and to transmit a second impulse upon the downward movement of the switch-hook to operate a supervisory signal for supervisory purposes. In the present proposed systems it has been found that one of the principal undesirable features is that when the called subscriber answers a call he causes the calling supervisory signal of the connected cord circuit to be operated by the upward movement of his switch-hook.

It is the object of my invention to produce an improved system of the character described which will obviate the above and other undesirable features and embody desirable features of construction and circuit arrangement in a simple, efficient and economical manner; and to the accomplishment of this object the invention consists in the novel details of construction and circuit arrangements as hereinafter described and pointed out in the appended claims.

Referring to the accompanying drawing, I have illustrated the preferred embodiment of my invention by showing substations A and D terminating in line circuits L and L¹ respectively, each comprising the usual jack

and line signal. The substation A comprises the usual receiver 2, transmitter 3, induction coil 4, bells 5, battery 6 and switch-hook 7. In addition the substation comprises a self-locking relay 8 mechanically connected with the switch-hook 7, contacts 9 and 10 and an auxiliary signaling battery 11. The relay 8 which responds to alternating current, upon energizing, attracts its armature 12 and permits the spring 14 to open contact with spring 15. The arm 16 is insulatingly connected to the hook switch lever 7 in such a manner that upon said hook switch lever reaching the extent of its off-normal movement, the hook portion 17 of the lever 16 engages the member 14 and permits the armature 12 of the relay 8 to return to normal and close contact between the springs 14 and 15. The contact 10 is insulatingly secured to the hook switch lever 7 and is adapted to engage the contact 9 upon both the upward and downward stroke of said hook-switch lever 7. That is, the contact 10 makes passing contact with the contact point 9 upon each movement of the switch-hook. The auxiliary battery 11 and talking battery 6 are adapted to be connected in series and bridged across the line when the contacts 9 and 10 are momentarily closed thereby operating the line drop or the supervisory signal as the case may be.

The link circuit C comprises the usual answering and calling plugs AP and CP inductively united through the heavily marked conductors. Associated with the answering plug AP is an answering supervisory drop ASD. Associated with the calling plug CP is a calling supervisory drop CSD. A ringing and listening key 18 is provided for connecting the operator's set O to the strands of the link circuit C and for bridging the ringing generator G across the conductors of the called subscriber's line. The substation D and its line circuit L¹, are similar in all respects to the substation A and its line circuit L.

Having described in general the apparatus used in establishing a connection between a calling and called substation, I will now describe the preferred embodiment of my invention more in detail.

Assuming that the subscriber at substation A wishes to converse with the subscriber at substation D, the subscriber by removing his receiver 2 from the switch-hook

7 allows the contact 10 to momentarily engage the contact 9 thus bridging the batteries 6 and 11 across the calling subscriber's line over a path extending from one terminal of the battery 11 through the springs 14 and 15, contacts 10 and 9 one limb of the calling subscriber's line, line drop LD, normal contact 19, the opposite limb of the subscriber's line and through the battery 6 to the opposite terminal of battery 11. The operator upon noting that line drop LD is in an operated position, inserts the answering plug AP of the link circuit C into the jack J, thereby disconnecting the line drop LD from across the calling subscriber's line. The operator then operates the ringing and listening key 18 to bridge her telephone O across the strands of the cord circuit, and inquires the wants of the calling subscriber.

The operator upon learning that the subscriber at substation D is desired, inserts the calling plug CP into jack J¹ of the line circuit L¹ thereby disconnecting the line drop LD¹ from across the called subscriber's line. The operator next operates the ringing and listening key 18 to bridge the generator G across the limbs of the called subscriber's line over a path extending from ungrounded terminal of generator G, through the tip conductor of the calling plug CP and jack J¹, relay 8¹, signal receiving device 5¹, sleeve conductors of jack J¹ and calling plug CP to ground and back to the opposite terminal of the generator G. The relay 8¹, upon energizing, attracts its armature 12¹ and allows the spring 14¹ to break contact with spring 15¹. The operator then restores the ringing key to normal and disconnects the generator G and bridges the calling supervisory drop CSD across the limbs of the called subscriber's line. The called subscriber in answer to the signal that he has received, removes his receiver from the switch-hook thereby allowing the contacts 9¹ and 10¹ to momentarily engage, but owing to the fact that contact 15 is out of engagement with contact 14, the auxiliary battery 11¹ and battery 6¹ are not bridged across the called subscriber's line. The switch-hook 7¹, upon reaching the extent of its upward movement, causes the arm 16¹ to lift the spring 14¹ from in front of the armature 12¹ of relay 8¹ and allows the said armature to restore to normal whereby the contacts 14¹ and 15¹ are again closed. The subscribers may now carry on conversation over the heavily marked conductors.

The subscribers at substations A and D having finished conversation, replace their receivers upon their respective switch-hooks. The replacing of the receiver at substation A permits the contacts 9 and 10 to again momentarily engage to bridge batteries 11 and 6 across the limbs of the

calling subscriber's line, thereby operating the answering supervisory drop ASD. The replacing of the receiver at substation D permits the contacts 9¹ and 10¹ to again engage and this time to bridge the batteries 11¹ and 6¹ across the limbs of the called subscriber's line thereby operating the calling supervisory drop CSD.

The operator noting the positions of the drops ASD and CSD, removes the answering plug AP and the calling plug CP from their respective jacks J and J¹ thereby again bridging the line drops LD and LD¹ across their respective lines.

From the foregoing it is thus seen that I have provided a local battery system in which the signaling current is all supplied from the subscribers' stations and in which accurate double supervisory is provided.

Although I have chosen a preferred embodiment for the purpose of illustrating my invention, yet I do not wish to be limited to the same as many changes and modifications may be made by one skilled in the art without departing from the spirit and scope of my invention, as set forth in the appended claims.

Having described my invention, what I claim as new and desire to secure by United States Letters Patent, is:

1. A telephone system comprising a subscriber's line provided with a substation, a link circuit for connection to said line, a supervisory signal for said link circuit, substation controlled means for operating said signal, means for signaling said substation, and means controlled by said signaling means for preventing an effective operation of said substation controlled means when the subscriber responds.

2. A telephone system comprising a subscriber's line, a substation therefor, a signaling battery for said substation, a pair of contacts under substation control, a signal at the central office, means for connecting said battery through said contacts to operate said signal, and automatic means located at the substation for preventing the operative connection of said battery through said contacts.

3. A telephone system comprising a subscriber's line, a substation therefor, a signaling battery for said substation, a pair of contacts adapted to be operated by the upward and downward movement of the switch-hook lever, a signal at the central office, means for connecting said battery through said contacts to operate said signal, and means for preventing the operative connection of said battery through said contacts to operate said signal, said last means comprising a relay responsive to signaling current.

4. A substation of the character described comprising a relay connected in the signal-

ing circuit of said substation, a signaling battery for said substation for operating a signal at the central office, and means controlled from the said central office for operating said relay when actuating the call bell at said substation, thereby preventing the use of said signaling battery to operate said signal when the subscriber responds to the call and operates his switch hook.

5. A telephone system comprising a subscriber's substation, a relay connected in the signaling circuit of said substation, a control circuit at said substation, signaling means controlled from the central office for operating said relay whereby said relay renders said control circuit ineffective, and means controlled by the subscriber at the substation for restoring said relay to normal, thereby again rendering said control circuit effective.

6. A telephone system comprising a subscriber's substation, a self-locking relay connected in the signaling circuit of said substation, a control circuit at said substation, signaling means controlled from the central office for operating said relay whereby said relay renders said control circuit ineffective, and means for subsequently unlocking said relay thereby rendering said control circuit effective.

7. In a telephone system, a subscriber's substation provided with a signaling battery, a relay at said substation, a supervisory signal at the central office, a switch-hook lever for momentarily connecting said battery to said signal, and means controlled from the central office for operating said relay, thereby preventing an operation of said signal when the said switch-hook lever is operated.

8. A telephone system comprising a subscriber's line, a substation therefor provided with a switch hook, a line signal for said line, a link circuit provided with a supervisory signal, means for operating said signals, means for connecting the said link circuit to the said line and for preventing an operation of said line signal, and substation means controlled from the central office for preventing the operation of said supervisory signal when the subscriber at the said substation operates his switch-hook.

9. A telephone system comprising a subscriber's line, a substation therefor provided with a switch hook, a link circuit provided with a supervisory signal, operator controlled means for connecting the said link circuit to the said line, means for operating said signal, and relay means controlled from the central office for preventing the operation of said supervisory signal when the subscriber at the said substation operates his switch-hook.

10. A telephone system comprising a called subscriber's line, a link circuit for connection to said line, signaling current con-

trolled from said link circuit, supervisory means bridged across the strands of said link circuit, a signaling battery at the substation of said line, and means responsive to the said signaling current for preventing the said signaling battery from affecting said supervisory means when the said subscriber responds.

11. In a telephone system, the combination of a called subscriber's line and an operator's link circuit connected thereto, signaling means for said link circuit, a signaling battery for said substation, and means at the substation responsive to the said signaling means for preventing the connection of said signaling battery to the said link circuit.

12. A telephone system including a subscriber's line, a drop bridged across said line, a signaling battery at the substation of said line adapted to be bridged across said line for operating said drop when the subscriber at the substation initiates a call, a link circuit adapted to be connected to said line, a supervisory signal for said link circuit, substation controlled means for operating said supervisory signal, means to prevent the operation of said line drop when the substation is used as a called line, and automatic means to prevent the operation of said supervisory signal when the substation is used as a called substation.

13. A telephone system including a subscriber's line, a substation therefor, a signal battery for said substation, a pair of contacts under substation control, a supervisory signal at the central exchange, means for operating said pair of contacts to connect said battery to the subscriber's line to operate said signal, and means for preventing the operative connection of said battery through said contacts to operate said signal, said last means comprising an electromagnet at the substation.

14. A telephone system including a subscriber's telephone line provided with a substation, a call signal device therefor, a link circuit for connection to said line, a supervisory signal for said link circuit, means controlled at said substation to operate said supervisory signal, means for operating said call signal device, and mechanism controlled by said last means for rendering ineffective the operation of said first means, but permitting the establishment of a conversational circuit including said substation.

15. A telephone system including a subscriber's telephone line extending to the central exchange, a relay connected in the circuit of said line and located at the substation thereof, a signal at the central office, means controlled at said substation for operating said signal, and signaling means controllable at the central office for operating said relay to render said first means in-

effective when the subscriber responds, but permitting the establishment of a conversational circuit including said substation.

16. A telephone system including a subscriber's line, a substation connected to said line, a lock-out device located at said substation, a link circuit at the central office for connection to said line, a supervisory device for said link circuit, a source of signaling current associated with said link circuit, means for connecting said current to said line to operate the call bell at said subscriber's substation and to operate said lock-out means to render said substation ineffective to operate said supervisory device when the subscriber responds, but permitting establishment of a conversational circuit including the talking apparatus at the substation.

17. A telephone system including a subscriber's line, an individual signal for said line, signaling means located at the substa-

tion upon said line for operating said individual signal when a subscriber at the substation initiates a call, a call signal device, a link circuit adapted to be connected to said line, a supervisory signal for said link circuit, said signal being controlled by said substation signaling means, and means located at the substation responsive to a source of current applied to said line from the central office to prevent the operation of said supervisory signal when the subscriber at the substation operates the said substation signaling means to operate said supervisory signal, said call signal device being simultaneously responsive to said application of current.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

JOSEPH S. ALLEN.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."