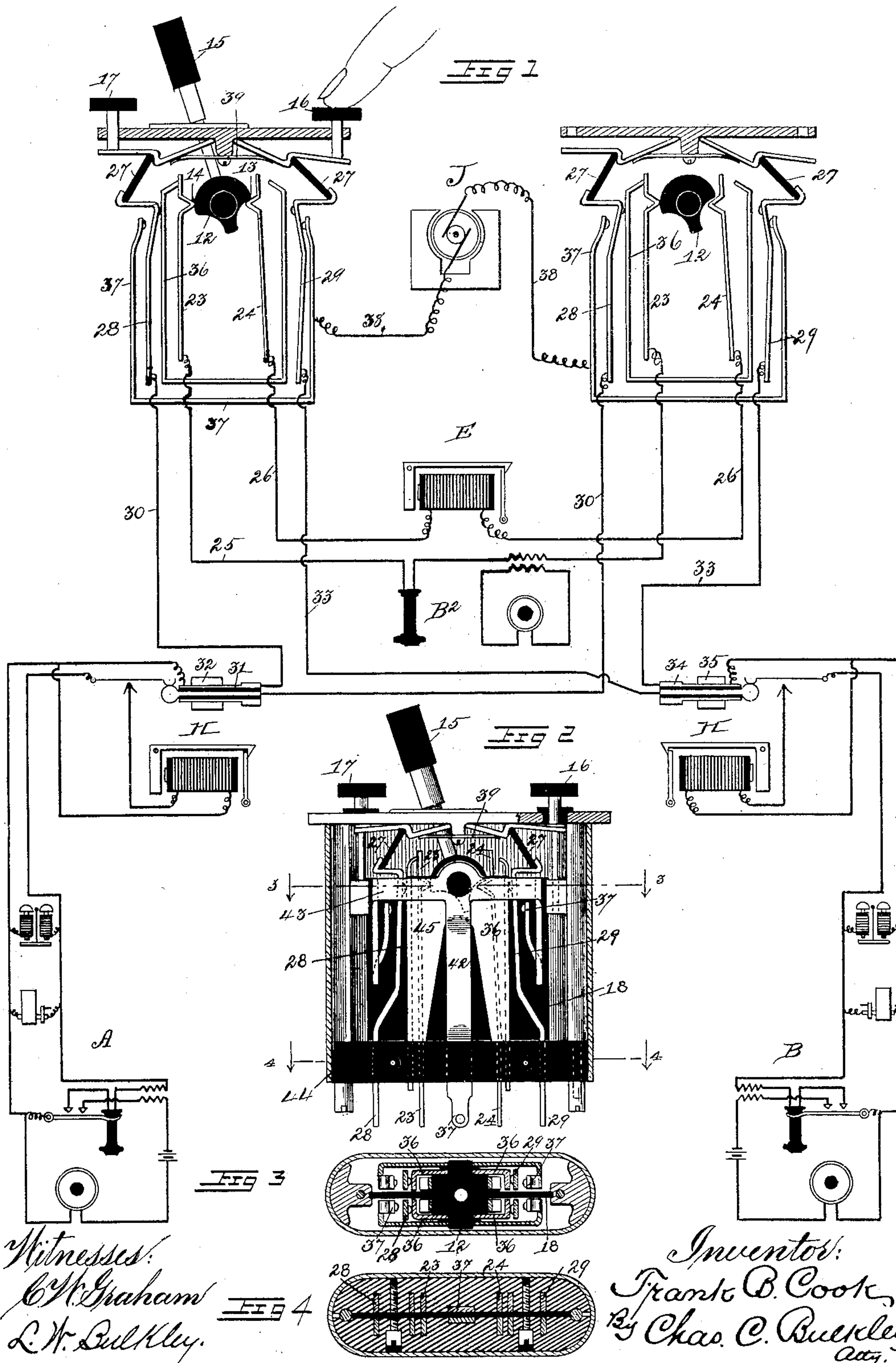


(No Model.)

F. B. COOK.
TELEPHONE APPARATUS.

No. 596,851.

Patented Jan. 4, 1898.



UNITED STATES PATENT OFFICE.

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TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 596,851, dated January 4, 1898.

Original application filed November 30, 1894, Serial No. 530,441. Divided and this application filed October 23, 1895. Renewed October 25, 1897. Serial No. 656,361. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. COOK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Telephone Apparatus, of which the following is a specification.

This application is a division of Serial No. 530,441, filed November 30, 1894.

My invention relates to certain improvements in that class of telephonic apparatus employed in conjunction with switchboards at central stations, which apparatus is employed by the operator to establish and disestablish communication between subscribers.

The object of my invention is to provide a single self-contained piece of apparatus capable of performing a number of different offices, which offices have heretofore been performed by several separate pieces of apparatus.

In telephone-switchboards wherein connections are made between lines by the use of plugs and cords apparatus must be provided whereby the operator's-telephone circuit may be at will connected to or disconnected from the cord-circuit and whereby a clearing-out or ringing-out drop may also be connected to or disconnected from the same circuit and whereby a ringing-current may be sent out over either of the two lines connected. These three provisions, as above mentioned, are usually accomplished by means of two sets of special apparatus, one for the switching of the operator's telephone and the clearing-out drop and another for connecting and disconnecting the circuit which supplies the ringing-current, and these two sets are located separately from each other.

My invention consists in a key which combines in one and the same piece of apparatus the several functions aforesaid, and has specific reference to the construction and arrangement of parts whereby this result is accomplished, reference being now had to the accompanying drawings, in which—

Figure 1 is a diagram view of the key included in the circuit with the operator's set and the sets of two subscribers, the key being adapted for use in complete metallic circuits and being shown divided into two parts

in this view for purposes of better illustration and the contact-springs also shown diagrammatically. Fig. 2 is a view of the apparatus, the casing being broken away to show the interior construction. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a sectional view on the line 4 4 of Fig. 2.

I will first proceed to a description of the apparatus as shown in Fig. 1 in conjunction with the lines leading to two subscribers' stations and including the operator's set, the signaling-generator, and clearing-out drop, it being understood, however, that in this view the duplicated parts of the apparatus on each side of an insulated partition are each shown in elevation.

In Fig. 1 I have designated the two stations as at A and B and have shown the instruments usually employed at such stations, the operator's set being located at B².

I provide a horizontally-extended and pivoted switching-bar 12, of insulating material, having laterally-extended contact pressing-points 13 and 14, the said switching-bar being actuated by the key-lever 15. I also provide ringing-keys 16 and 17, adapted to ring either to station A or station B, as may be desired. On each side of an insulating-partition of the apparatus 18, Fig. 2, I provide duplicate sets of contacts and connections when the key is included in a complete metallic circuit, as shown herein; but it is evident that with earth or ground connections only one set of contacts and connections need be employed. In Fig. 1 I have shown the contacts and connections diagrammatically, these sets of contacts and connections each consisting of the movable spring operator's contacts 23 and the ring-off contacts 24, the spring operator's contacts 23 being included by the leads 25 in circuit with the operator's set B², while the ring-off or clearing-out drop E is included in circuit with the ring-off spring-contacts 24 by means of the lead 26. The intermediate connecting-bars 27 are also of insulating material, and upon being operated by the ringing-key buttons 16 and 17 bear against and operate the movable cord-circuit contact-springs 28 and 29, the cord-circuit 30 being connected with the plug 31, which is shown inserted in the spring-jack 32 of station A, while the contact-springs 29

are connected with the cord-circuit 33 of the plug 34, shown inserted in the spring-jack 35 of station B. Located intermediately between the cord-circuit spring-contacts 28 and 29 and the operator's and ring-off spring-contacts 23 and 24 are the fixed connecting-conductors 36, and on each side of the cord-circuit spring-contacts 28 and 29 are the signal-generator connecting-conductors 37, to which the leads 38 of the ringing-generator J are connected.

The operation of my device in connection with metallic circuits shown in Fig. 1 is as follows, it being assumed that station A desires to communicate with station B: The subscriber at station A sends a signal over the circuit in the usual manner, which drops the individual annunciator II of that subscriber. This circuit may be traced as follows: from station A, over one of the leads to spring and contact of jack 32, through the individual annunciator H to the other lead, and thus back to station A. To answer station A, the operator inserts the plug 31 into the jack 32, and the lever 15 being in the position shown the point 14 of the switching-bar 12 holds the contact-springs 23 in contact with the connecting-conductors 36, with which connecting-conductors the cord-circuit spring-contacts 28 and 29 are normally in contact to preserve the continuity of the circuit. The operator's telephone set at B² is now looped in the circuit with the subscriber's set at station A, which circuit may be traced as follows: from station A, over one of the leads to contact-spring of the jack 32, tip of the plug 31, cord 30, spring-contact 28, connecting-conductor 36, spring-contact 23, and lead 25 to the operator's set B², thence through said set to lead 25, spring-contact 23, connecting-conductor 36, spring-contact 28, cord 30 to sleeve of the plug 31, body of the jack 32, and thence by the other lead to the starting-point at station A. After talking with station A and being informed that a connection is desired with station B the operator inserts the plug 34 in the jack 35 and depresses the button of the ringing-key 16 to actuate the key and signal the called subscriber. This result is accomplished by means of the pivoted arm 40 and pivoted bar 27, which forms the intermediate connector, pressing against the contact-spring 29, and causing them to break their normal contacts with the connecting-conductors 36 and make contacts with the conductors 37, which conductors are connected by the leads 38 to the generator J, thus connecting the generator in the circuit with the apparatus at station B in order to ring the bell and attract the attention of the subscriber at that station. This circuit may be traced as follows: from generator J to lead 38, conductor 37, contact-spring 29, cord 33, tip of the plug 34, contact-spring of the jack 35, over one of the leads to station B, thence through the apparatus at said station to the other lead, to body of the jack 35, sleeve of the plug 34, cord 33, spring-

contact 29, conductor 37, and by lead 38 back to the other side of the generator.

It will be observed that the operator may without interference hold conversation with the subscriber of station A while ringing station B.

When the operator ceases to depress the button of ringing-key 16, the contact-springs 29 automatically break contact with the conductors 37 of the generator-circuit, and by the tension of said springs 29, assisted by the spring 39, which bears upon the pivoted arm 40, the normal contacts between the contact-springs 29 and the connecting-conductors 36 are restored and the circuits to the stations A and B connected together. The complete circuit between these stations may be traced as follows: from station A, over the lead to contact-spring of the jack 32, tip of the plug 31, cord 30, spring-contact 28, connecting-conductor 36, spring-contact 29, cord 33, tip of the plug 34, contact-spring of the jack 35, over the lead to and through station B, thence by the other lead to body of the jack 35, sleeve of the plug 34, cord 33, contact-spring 29, connecting-conductor 36, contact-spring 28, cord 30, sleeve of the plug 31, body of the jack 32, and thence over the other lead back to station A.

It is evident that station A may be signaled with the ringing-key 17 in the same manner as station B is signaled with the key 16.

The operator may at will, by means of the lever 15, connect to or disconnect from the circuit the telephone set B² or the clearing-out drop E. Throwing the lever 15 in one position causes the contact pressing-point 14 of the pivoted switching-bar 12 to force the contact-springs 23 of the telephone-circuit into contact with the connecting-conductors 36, which conductors are always part of a connected circuit except when the ringing-keys are depressed. The telephone-circuit is as follows: from one connecting-conductor 36, by contact-spring 23 and lead 25 to telephone set B² and thence by lead 25 and contact-spring 23 to the other connecting-conductor 36. Throwing the lever 15 in its oppositely-oscillatable position disconnects the springs 23 and consequently the telephone set and causes the contact pressing-point 13 of the switching-bar 12 to force the contact-springs 24 of the drop-circuit into contact with the connecting-conductors 36. The drop-circuit is as follows: from one connecting-conductor 36, by contact-spring 24 and lead 26 to clearing-out drop E and thence by lead 26 and contact-spring 24 to the other connecting-conductor 36. The springs 23 and 24 are adjusted with a tension toward the bar 12, and I prefer to have them so adjusted that the contacts on one side will be made before the other side is released—that is, the telephone would be connected before the drop is disconnected, and vice versa. It will be observed that when the operator has only one plug inserted the set B² is in effect looped in on the circuit;

but when both plugs are inserted the operator's set and also the clearing-out drop are bridged across the circuit.

By reference to Figs. 2, 3, and 4 it will be observed that the connecting-conductor 36 differs in construction from the diagrammatic representation in Fig. 1, being made in one piece and straddling the connecting generator-conductor 37, which latter consists of the lengths 42 and the transverse pieces 43, forming an outer conducting-frame, with depending arms, to which the contact-pieces 37 are secured. The switching-bar 12, of insulating material, is journaled in said transverse piece 43 or outer conducting-frame and also journaled in the connecting-conductor 36, which forms an inner frame. This connecting-conductor 36 is provided with legs 45, which are attached to and held by the insulating-base 44. The base 44 is attached to and supported from the top plate 46 by the projections 47, which are threaded at their lower ends and secured to the base 44 with the nuts 48. The base and top plate, with the projections, thus form a rigid supporting-frame for mounting the different parts. The various contact-strips are firmly held in the insulating-base 44 and, together with all the other parts between the top plate 46 and the base 44, are inclosed by a suitable cover and mounted in the switchboard.

My invention admits of various modifications which to those skilled in the art would suggest themselves, and therefore I do not limit myself to the precise construction shown or described.

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

1. An organized self-contained single piece of switchboard apparatus designed to accomplish the various specified functions and comprising in organization a pivotal manually-vibrated key-lever, a rotatable switching-bar having projections, cord-circuit operator's signal and clearing-out-signal contacts, a connecting-conductor between the operator's contact and the clearing-out contact which also connects the cord-circuit contacts, a connecting-conductor with which the signal-generator circuit is connected and ringing-keys for ringing out on either cord-circuit whereby the cord-circuit contact over which the signal is to be sent may be brought against the connecting-conductors with which the generator-circuit is connected, the switch-bar and key operating the same serving to bring the operator's-circuit contacts against the cord-circuit contacts or the clearing-out-circuit contact against the cord-circuit contact.

2. A combined listening and ringing key consisting of a contact spring or springs controlled by a push button or buttons and intermediate mechanism between the button and said contact-spring comprising a hinged

arm moved by depressing the button and an intermediate connector normally resting loosely between said arm and the contact-spring.

3. A combined ringing and listening key consisting of a supporting-frame including a base-piece held therein, spring-contacts mounted in the base and projected upward therefrom, inner and outer conducting-frames, and spring-contacts held by said frames together with a listening-key lever centrally positioned, and ringing-key buttons located at either side of said lever, each one of which is operable independently of the other.

4. A combined ringing and listening key, consisting of a supporting-frame, an outer conducting-frame with arms depending from said outer frame, contact-pieces secured thereto and an inner frame located within the outer frame, together with contact-strips, ringing-buttons and lever apparatus located exteriorly of the supporting-frame and operable each one independently of the other.

5. A combined listening and ringing key, consisting of a key-lever and ringing-buttons, each operable one independently of the other, spring-contact strips connected respectively with the generator-circuit, the cord and plug circuits, the clearing-out drop-circuit, and the operator's-telephone circuit, said telephone and clearing-out spring-contact strips being adapted to be each independently of the other forced by the key-lever into contact with a continuous conductor, with which the cord and plug spring-contact strips are normally in contact, but adapted to be each independently of the other, forced by the ringing-buttons from said normal contact into contact with the generator-strips.

6. A single self-contained piece of switchboard apparatus consisting of spring-contact strips and contact parts adapted to be connected respectively in and form a part of line-circuits, an operator's-telephone circuit, and a circuit containing a generator or other source of electricity, the line-circuit spring-contacts normally preserving the continuity of the line-circuit but adapted to each independently of the other disrupt and divide the continuous line-circuit into two circuits and include the generator in either one of these two now independent circuits, and the telephone or drop contacts adapted each to be independently of the other connected to and disconnected from the line-circuit, together with means for operating the various spring-contact strips.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK B. COOK.

Witnesses:

CHAS. C. BULKLEY,
W. T. TOMPKINS.