No. 618,610. Patented Jan. 31, 1899.

J. M. OVERSHINER.

TELEPHONE SWITCHBOARD.

(Application filed Oct. 10, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

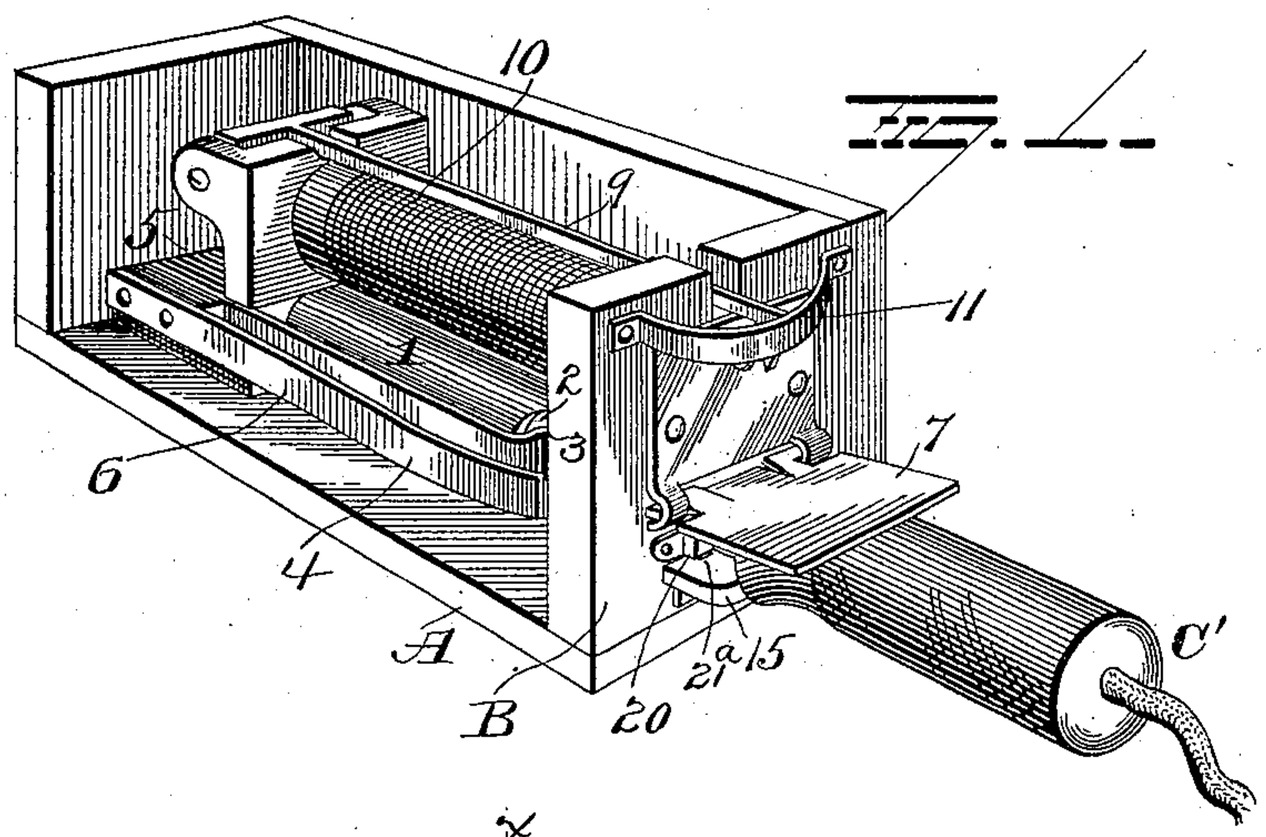


Fig. 2.

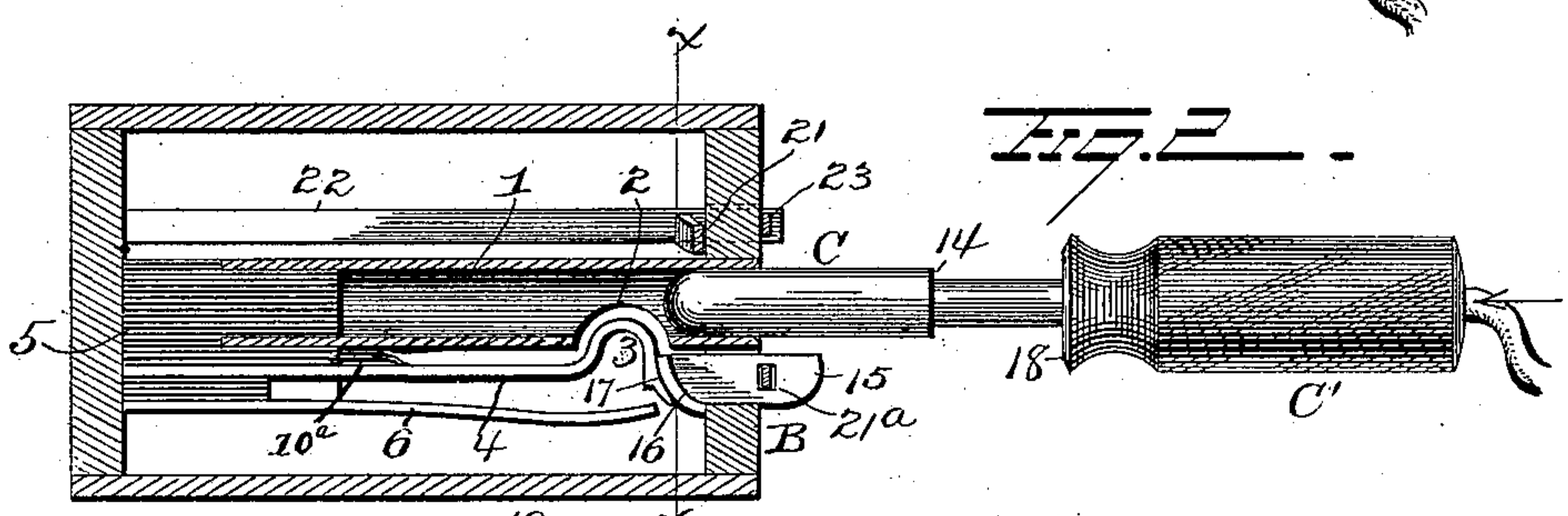


Fig. 4.

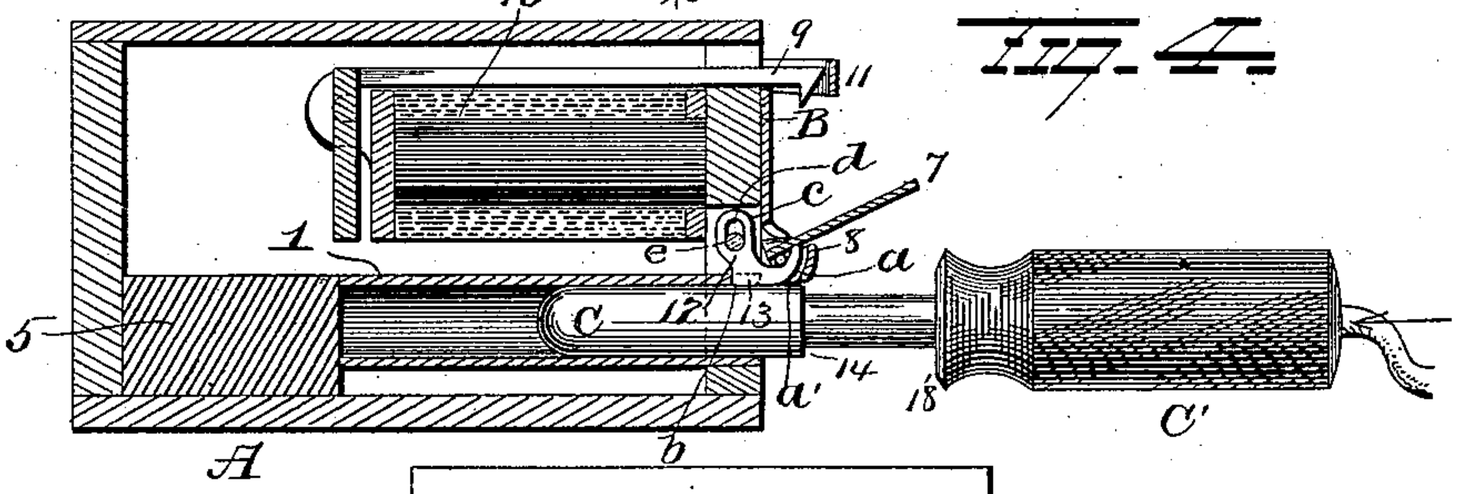
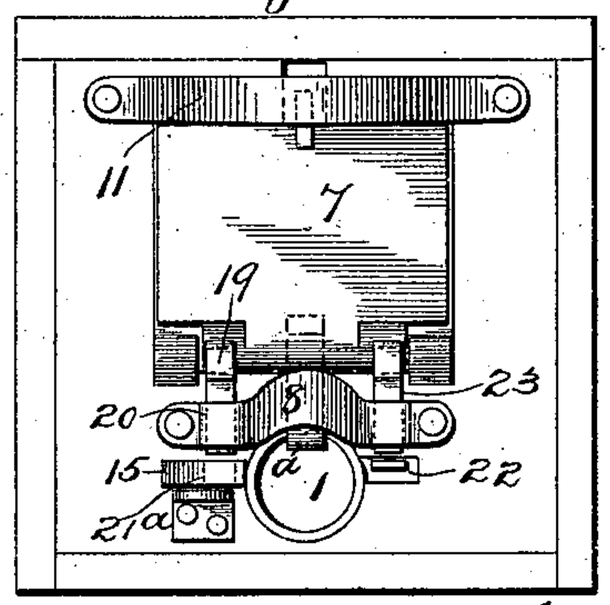


Fig. 3.



WITNESSES

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TELEPHONE SWITCHBOARD.

(Application filed Oct. 10, 1898.)

(No Model.) 2 Sheets—Sheet 2.

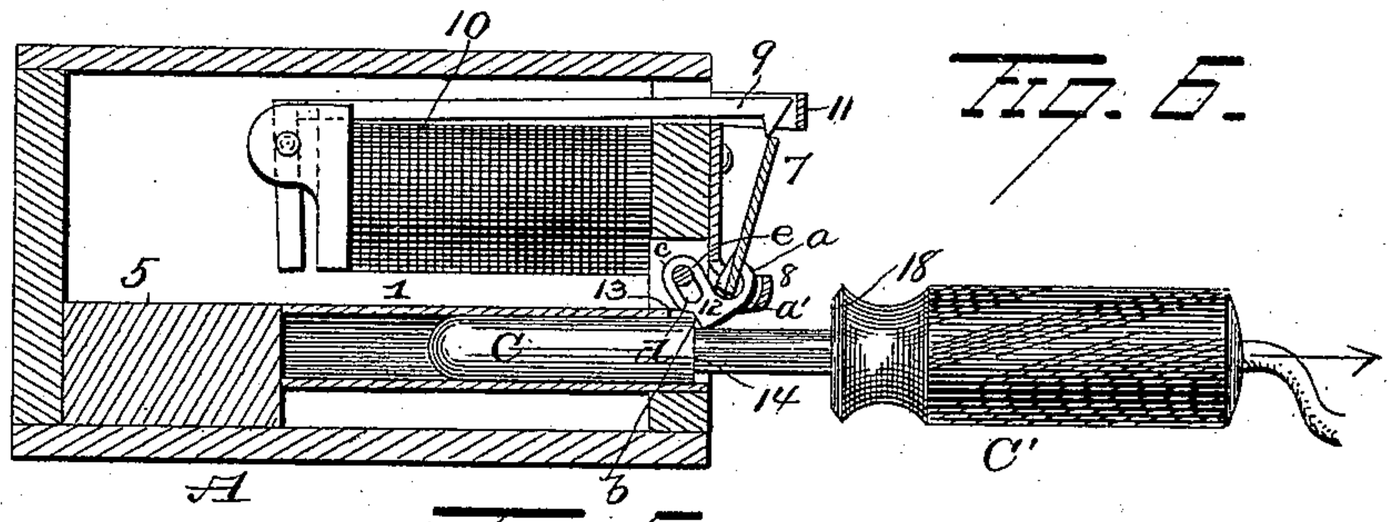


FIG. 6.

FIG. 5.

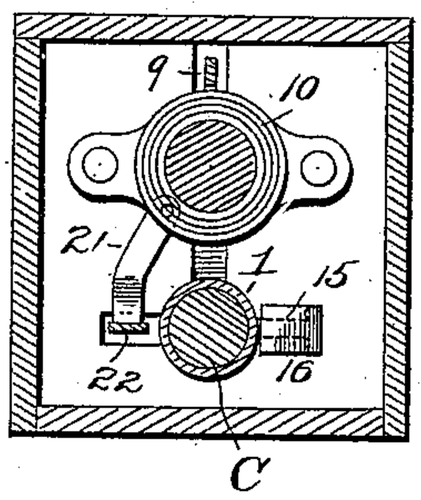
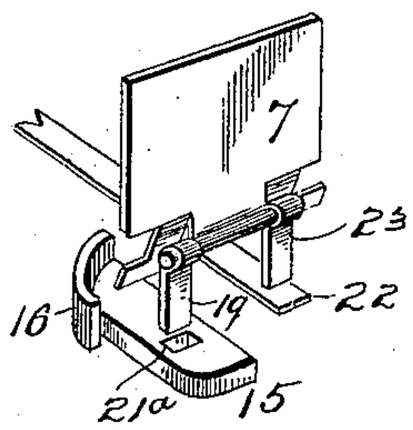


FIG. 7.



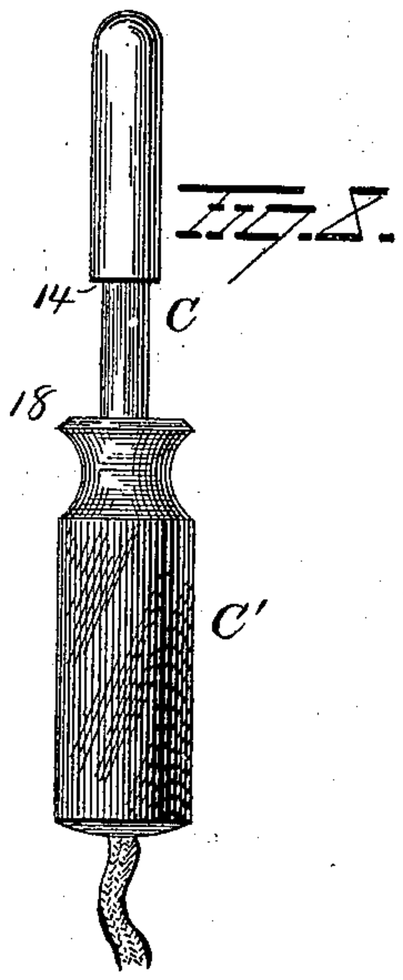


FIG. 8.

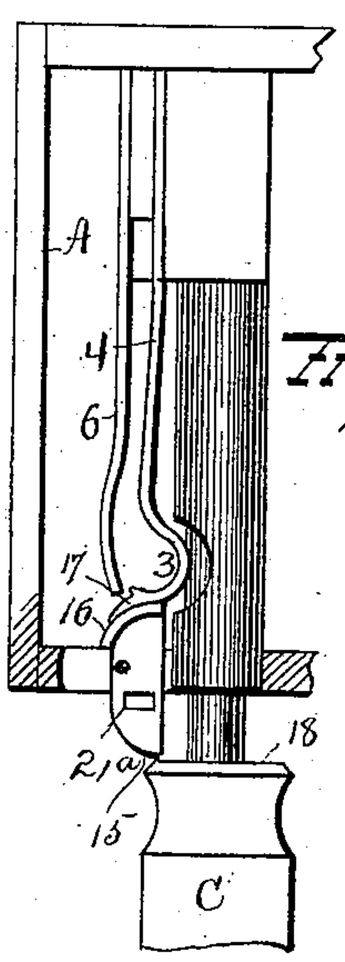


FIG. 10.

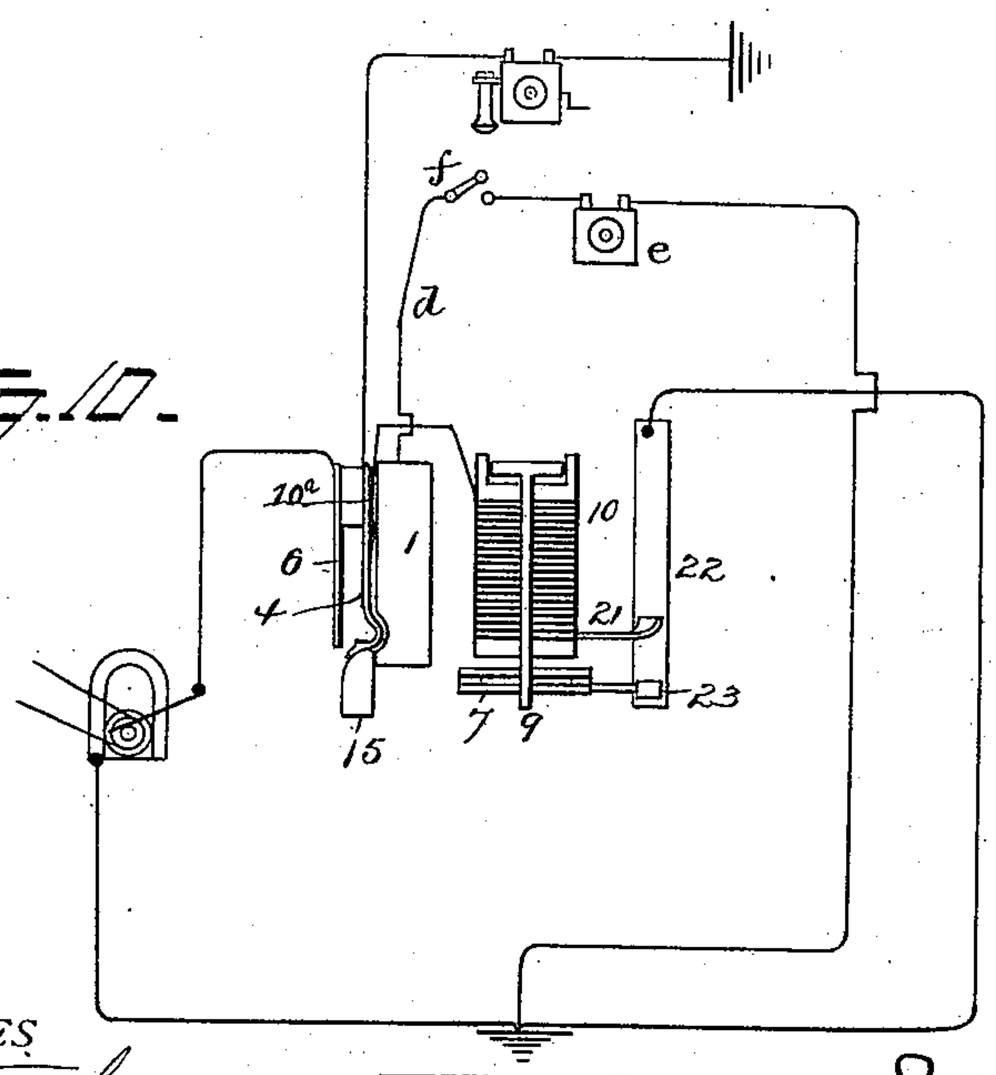


FIG. 9.

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UNITED STATES PATENT OFFICE.

JAMES M. OVERSHINER, OF ELWOOD, INDIANA.

TELEPHONE-SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 618,610, dated January 31, 1899.

Application filed October 10, 1898. Serial No. 693,162. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. OVERSHINER, a resident of Elwood, in the county of Madison and State of Indiana, have invented certain new and useful Improvements in Telephone-Switchboards; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in telephone-switchboards, one object of the invention being to so construct the jack and drop devices of each subscriber's line that the drop will be automatically restored to the latch when the plug is withdrawn from the jack-socket and not when it is inserted thereinto.

A further object is to so construct and arrange the jack and drop devices that the drop-magnet will be automatically cut out when the drop falls, whereby to reduce the resistance in the circuit when the drop-magnets of two subscribers' lines are in circuit and one or the other subscriber "rings off."

A further object is to provide means whereby the signal-operating devices will be automatically locked positively when a drop falls.

A further object is to construct and arrange jack and drop devices in such manner that when a subscriber calls central office the drop or annunciator of his line will fall, cut out the drop-magnet, and lock the signal-operating devices, so that when a plug is inserted into the jack-socket of the line the drop will not be restored, so that the plug at the opposite end of the cord can be inserted into the jack-socket of another line for the purpose of connecting the two lines without disturbing the drop, so that said second plug can then be manipulated to operate the signal-operating devices, so that the drop of the called subscriber can fall while the plug is in the jack-socket and lock the signal-operating devices, and so that both plugs can be made to restore the drops as they are withdrawn from the jack-sockets without danger of manipulating the signal-operating devices.

A further object is to provide means whereby to prevent the cord becoming entangled with the latch of the drop and the protruding member of the signal-operating devices.

A further object is to provide switchboard devices which shall be simple in construction, reduce the time consumed and labor performed by the operators to a minimum, and which shall be cheap and simple to construct, which shall comprise but few parts not liable to get out of order, and which shall be effectual in all respects in the performance of their functions.

With these objects in view the invention consists in the combination, with a jack, a drop, and a plug, of a drop-restoring device actuated by the plug to restore the drop only when the plug is withdrawn from the jack.

The invention further consists in the combination, with a jack, a drop, and a plug, of a pivoted device adapted to coöperate with the plug and drop, whereby to restore the latter, said pivoted device being so disposed as to permit the insertion of the plug into the jack without restoring the drop, but insuring the restoration of the drop when the plug is withdrawn.

The invention further consists in the combination, with a jack, a drop, and a plug having a shoulder, of a pivoted device constructed and adapted to permit the passage of the shoulder on the plug without restoring the drop when the plug is inserted into the jack and to coöperate with said shoulder on the plug to restore the drop when the plug is withdrawn from the jack.

The invention further consists in the combination of a subscriber's-line circuit, an annunciator-drop therefor, a magnet for the drop, a cut-out for the magnet, and means actuated by the drop when the latter is released by the action of the current sent over the line by a subscriber for opening said cut-out.

The invention further consists in the combination, with a normally-closed subscriber's-line circuit and an annunciator-drop, of a magnet for the drop included in series in said circuit, a cut-out also included in said normally-closed subscriber's-line circuit, and means actuated by the drop when it falls to open said cut-out; and the invention further consists in certain novel features of con-

struction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a structure embodying my invention. Fig. 2 is a horizontal sectional view. Fig. 3 is an end view. Fig. 4 is a vertical sectional view; Fig. 5, a transverse section on line *x x* of Fig. 2. Fig. 6 is a vertical sectional view showing the plug partially withdrawn from the jack-socket and the drop nearly restored. Fig. 7 is a detail view showing the drop, circuit-breaker, and signal-lock. Fig. 8 is a detail view of the plug. Fig. 9 is a diagrammatical view. Fig. 10 is a view showing a modification of the signal-operating device.

A represents the base-plate, and B the end piece, of a frame for sustaining the jack and drop devices of a subscriber's line, a number of such structures when assembled and supported by a suitable back constituting a telephone-switchboard. A jack-socket 1 is disposed over the base and communicates at one end with a hole in the end or front piece B for the accommodation of the plug C. The jack-socket 1 is made in its side with a hole or opening 2, into which a shoulder 3 on a spring-jack 4 projects, said spring-jack and the jack-socket being preferably secured at their rear ends to a block 5, of insulating material, secured to the base A. A spring-arm 6 is secured at its rear end to an insulating-piece projecting upwardly from the base A, and said arm 6 is disposed parallel with the spring-jack and terminates in proximity to the free end of the latter. The spring-jack is included in circuit with a subscriber's line in any suitable manner, and the spring-arm is included in circuit with the generator at the central office, by means of which current is supplied for sounding the subscriber's signals.

An annunciator-drop 7 is hinged at its lower edge to the front piece B of the frame just above the entrance to the jack-socket and is adapted when released to assume a horizontal position and expose the number of a subscriber's line, in which position the drop will be supported by means of a bent arm 8, onto which it falls. The drop is maintained normally in its raised or closed position by means of a latch 9, projecting from the pivoted armature of the drop-magnet 10. One terminal of the coil of magnet 10 is connected through a cut-out, hereinafter described, with the ground, and the other terminal is connected to a contact-spring 10^a, which latter is normally in contact with the jack-spring 4, and to the latter the subscriber's line is connected. A guard 11, secured at its ends to the front piece B of the frame, serves to protect the latch and prevent the cords which connect the plugs in pairs from becoming entangled therewith.

The bent arm or stop 8 above referred to serves in a like manner to protect a small cam or lever 12, pivotally supported in a slot in the front piece B above the jack-socket and adapted to normally project through a notch 13 in the end of the jack-socket. The cam or lever 12 is made approximately L-shaped, having a hook-shaped arm *a* with a curved lower face *a'* and terminating at its rear end in a shoulder *b*, from which point the other arm *c* of the cam or lever projects. The arm *c* of the cam or lever may be widened or thickened somewhat, if desired, and is made with an elongated slot *d*, through which the pivot *e* passes. Normally the arm *a* of the cam or lever is disposed in a horizontal position within the notch 13 of the jack-socket, in which position it is maintained by the engagement of the shoulder *b* with the end of the notch 13. The plug C is provided with the usual handle C', and in proximity to the handle the plug is reduced somewhat, so as to form an annular shoulder 14 some distance from the free end of the plug. When the plug thus constructed is inserted into the jack-socket, it will engage the curved arm *a* of the cam or lever 12 and push it out of the way, said cam or lever being permitted to rise on account of the elongated slot in its arm *c* and prevented from turning by engagement with the end of the notch 13. As soon as the plug has been forced into the jack-socket sufficiently to cause the shoulder 14 to pass the cam-lever the latter will drop into the recess in the plug and the shoulder *b* on the cam-lever will become disposed in front of the shoulder 14 on the plug.

Assuming now that the drop has fallen to its horizontal position, the withdrawal of the plug from the jack-socket will by the engagement of the shoulder on the plug with the shoulder on the cam-lever cause the latter to turn on its pivotal support and its curved or hook-shaped arm *a* to engage the drop and raise it to restore it to the latch. It will be observed that the shoulder 14 is some distance from the free end of the plug, and hence the cam-lever will be held up against the drop and the drop in engagement with the latch for an appreciable length of time after the plug first operated the cam-lever to restore the drop. By thus holding the drop up to the latch during nearly all the time the plug is being withdrawn from the jack-socket the retention of the drop will be insured and there will be no danger of the drop rebounding before being engaged by the latch, as might occur were a sudden and short impulse given to the cam-lever.

It will be observed that the drop is not and cannot be restored by the insertion of the plug, and for the sake of economy of time and labor on the part of the operators at the central office and also wear and tear on the board it is desirable that the drop should not be thus restored. The restoration of the drop when the plug is withdrawn from the jack-socket and at no other time is an important and essential feature of my present invention.

A slide 15 is mounted in the front piece B of the frame to one side of the jack-socket and adapted to project outwardly therefrom. The slide terminates in a beveled head or end 16, which normally bears against a beveled face 17 at the free end of the spring-jack, so that when the slide is moved (by the pressure against it of the shoulder 18 at the forward end of the plug-handle) the engagement of the beveled portions 16 17 will cause the jack to move outwardly out of contact with the plug and contact-spring 10^a and into contact with the spring-arm, thus including the signaling-generator in circuit with a subscriber's line without including the plugs and cord and another subscriber's line in said signaling-circuit.

In order to prevent the signaling-generator from being thrown onto a subscriber's-line circuit when the operator inserts the plug for listening purposes or to prevent her from accidentally signaling a subscriber when she is in the act of withdrawing a plug from a jack-socket, I provide an automatically-operating means for locking the slide 15 when a drop is down. For this purpose a latch 19 is loosely attached to the drop and is guided by a small loop or eye 20 at one end of the stop-arm 8, the lower end of said latch being adapted to enter a notch 21^a in the slide when the drop falls.

It is evident that the part 15 may be pivoted at a point between ends instead of being adapted to slide, as above explained, in which case it would operate as a lever when actuated by the plug to move the spring-jack 4. Any suitable means may be provided for manipulating a listening-circuit, and said circuit may be closed by the insertion of the plug into the jack-socket or any other desired manner, said listening-circuit and the particular means for closing the same constituting no part of my present invention. However, in order to make the operation of my improvements clear I have shown in the diagrammatical view, Fig. 9, a listening-circuit *d*, including an operator's phone *e* and a switch *f*.

When a subscriber calls central office, the annunciator-drop for his line will fall and lock the slide of the signaling device. The operator will insert a plug into the jack under the fallen drop, close the listening-circuit, and ascertain the number of the subscriber wanted. She will then insert the plug at the other end of the same cord into the jack-socket of the subscriber's line wanted. The annunciator-drop of the second subscriber's line has not fallen, and hence the slide remains unlocked. The operator will therefore press the plug-handle against the slide, so as to operate it in the manner above explained to move the spring-jack away from the plug and into contact with the spring-arm 6 of the signaling-circuit, thus calling the subscriber wanted. When the subscribers shall have concluded their use of the lines, one (or both) will ring off, and thus cause the drop of the called subscriber's line to fall, denoting that the lines are idle. Thus when both drops are down the operator will know that the subscribers are through talking and that she may remove the plugs without further inquiry. Upon withdrawing the plugs the drops will be restored to the latches, as above explained.

The amount of current sent over the line by the subscriber for the purpose of "ringing off" is quite small and at times might fail to properly release the drop of the called-subscriber's line. It is therefore desirable in order to reduce the resistance on the line to cut out the drop-magnet on the calling-subscriber's line. This I accomplish automatically in a manner which will now be explained. The circuit of each drop-magnet includes a circuit-breaker or cut-out comprising an arm 21 and a spring 22, normally in contact with each other. The drop is provided with an arm 23, (connected with the drop in the same manner as the latch 19, but at the other side of the jack-socket,) adapted, when the drop falls, to engage the spring 22 and move it away from the arm 21, thus opening the magnet-circuit. It will be seen, therefore, that as soon as the calling-subscriber's drop falls the drop-magnet will be cut out of circuit and that when either subscriber rings off the circuit will only include the drop-magnet of the called subscriber and will be amply sufficient to operate the same.

The cutting out or open-circuiting of the drop-magnet when a subscriber calls serves a further useful purpose. When the drop-magnet (which is normally in circuit with the subscriber's line) is thus open-circuited, the subscriber cannot again ring his bell, and this fact serves as notice to the subscriber that the drop for his line at the central office has properly fallen, and, again, by open-circuiting the line a subscriber is not only prevented from ringing his own bell, but is prevented from causing the ringing of the bells of the other phones on the same line, and thus a great amount of unnecessary noise in the rooms where phones are located is obviated.

Heretofore subscribers calling central office when the operators are very busy would get impatient and ring a second time. The drop being down, the latch device on the board will be vibrated to the annoyance of the operator. By causing the drop-magnet, and consequently the whole line, to be automatically open-circuited when the drop falls this annoyance to the operator will be obviated. Just as soon as a subscriber calls the drop at the central office falls and opens the subscriber's-line circuit and all noise then ceases. The subscriber's line will be again closed when the operator shall have inserted a plug into the jack-socket.

It is of course understood that the structures for the various subscribers' lines are ar-

ranged in rows one above another, so that the guards will not only prevent the cord from catching into and injuring the latches, but the slide or levers of one structure being near the latch of the next lower structure the guard will protect said slide or levers also from interference with the cord.

My improvements are simple and effectual in the performance of their functions.

Numerous slight changes might be made in the details of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details herein set forth.

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

1. The combination with a jack, a drop and a plug, of a drop-restoring device actuated by the plug to restore the drop only when said plug is withdrawn from the jack.

2. The combination with a jack, a drop and a plug, of a drop-restoring device constructed and adapted to permit the insertion of the plug into the socket of the jack without restoring the drop and actuated by the plug to restore the drop when the plug is withdrawn from the jack, substantially as set forth.

3. The combination with a jack, a drop and a plug, of a pivoted device adapted to be actuated by the plug to restore the drop, said pivoted device being so disposed as to permit the insertion of the plug into the jack without restoring the drop but insuring the restoration of the drop when the plug is withdrawn from the jack.

4. The combination with a jack, a drop and a plug having a shoulder, of a pivoted device constructed and adapted to permit the passage of the shoulder on the plug without restoring the drop when the plug is inserted into the jack and to coöperate with the shoulder on the plug to restore the drop when the plug is withdrawn from the jack, substantially as set forth.

5. The combination with a jack, a drop and plug having a shoulder, of a cam-lever mounted to slide and have a pivotal movement, means for preventing said cam-lever from swinging on its pivotal support when the plug is inserted into the jack, but permitting it to swing and restore the drop when the plug is withdrawn from the jack, substantially as set forth.

6. In a telephone system, the combination with two normally-closed subscribers' lines, a jack for each line, an annunciator magnet and drop for each line, a circuit-breaker in series with each normally-closed subscriber's line, said circuit-breakers connected with and operated by the annunciator-drops when they fall, means for connecting two subscribers' lines and means for signaling the called subscriber without releasing the drop of said called-subscriber's line whereby when either subscriber rings off, the annunciator of the called subscriber only will be in circuit and act as a clearing-out signal.

7. The combination in a switchboard, of an annunciator-drop and signaling device, of means for automatically locking the signaling device when the drop falls.

8. The combination in a switchboard, of an annunciator-drop, a signaling device, and means operated by the drop when it falls to lock the signaling device, substantially as set forth.

9. The combination with a jack and a plug, of a signal-controlling device in proximity to the jack and adapted to be operated by the plug and an automatic locking device for the signal-controlling device, substantially as set forth.

10. The combination with a jack and a plug, of a signal-controlling device comprising a spring-arm, and a device to be moved by the plug and adapted to move the jack away from the plug and into engagement with said spring-arm.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES M. OVERSHINER.

Witnesses:

MINNIE SMITH,

HENRY HUGHS.