

(No Model.)

3 Sheets—Sheet 1.

C. C. GOULD & W. SMITH.
TELEPHONE SWITCH SYSTEM.

No. 355,928.

Patented Jan. 11, 1887.

Fig. 1.

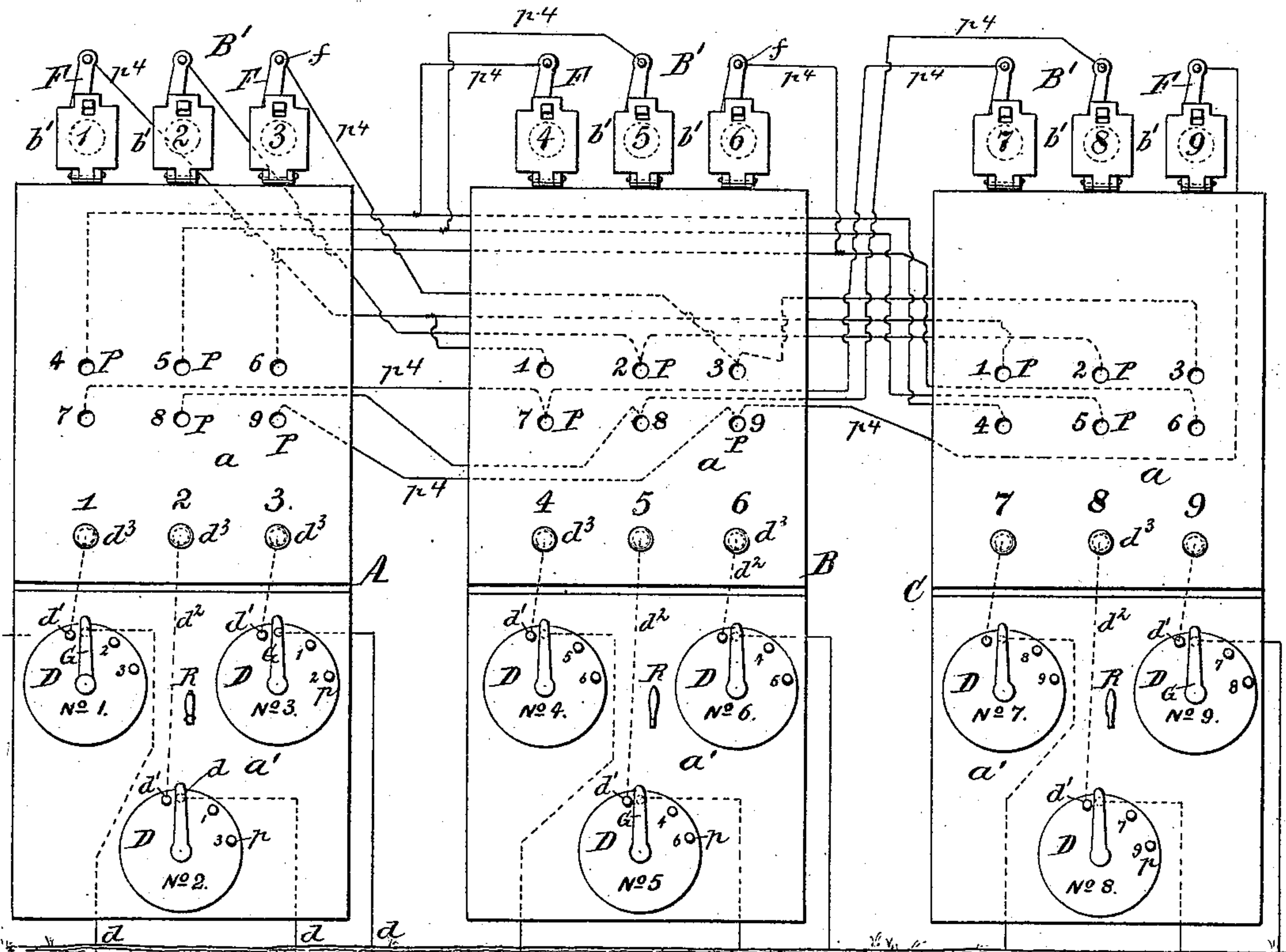
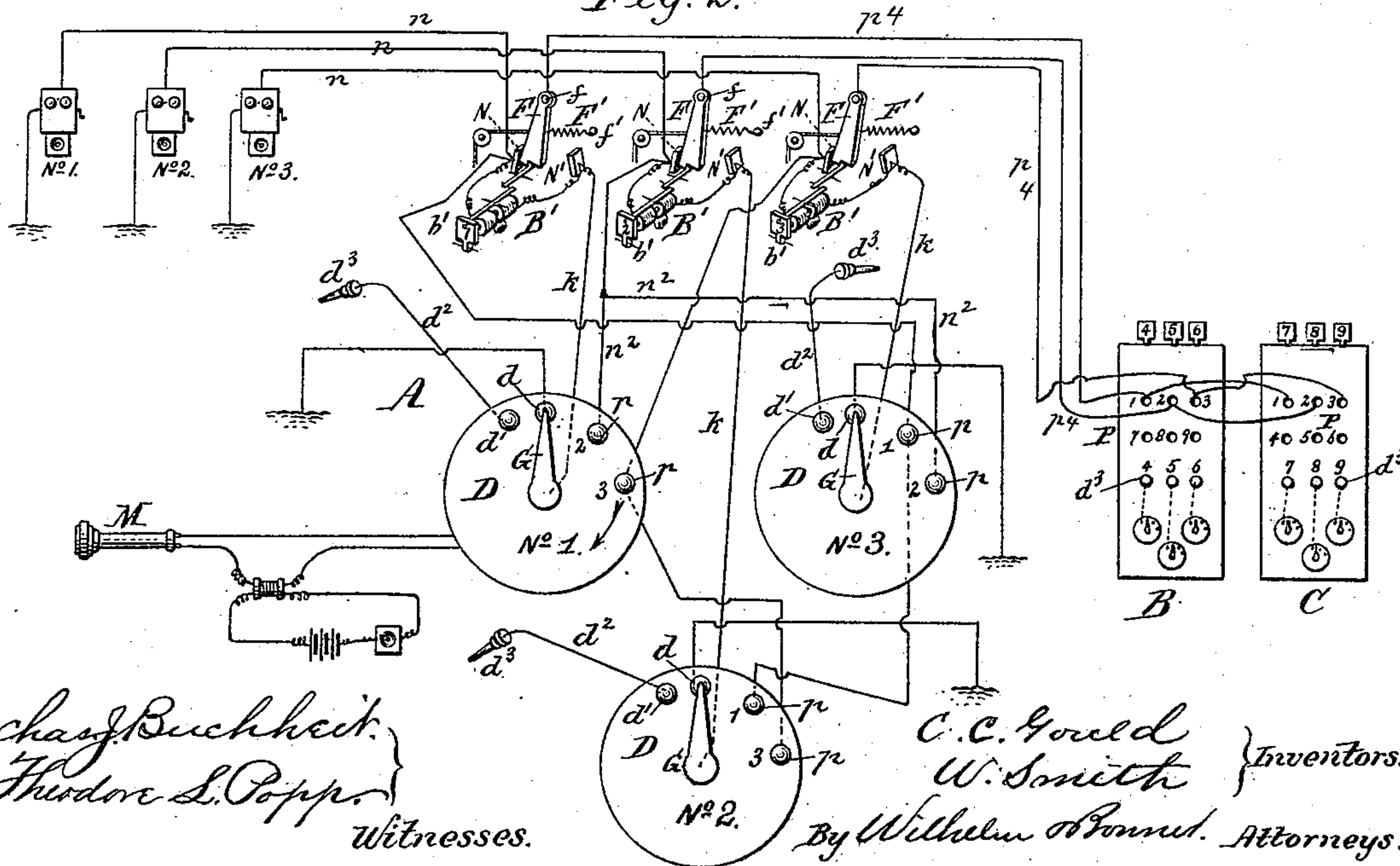


Fig. 2.



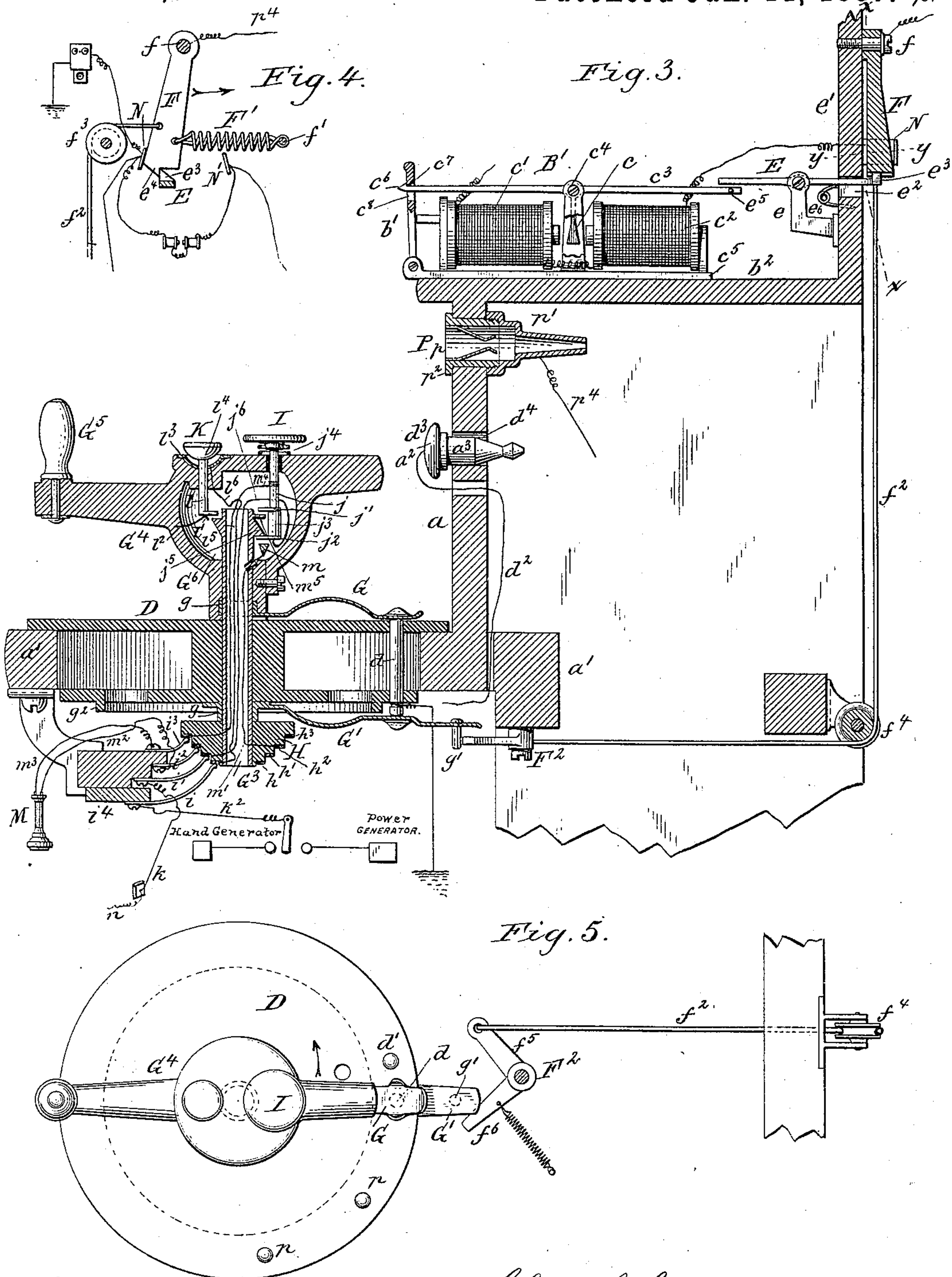
Chas. Buchheit.
Theodore L. Popp.
Witnesses.

C. C. Gould
W. Smith } Inventors.
By Wilhelm O. Popp. Attorneys.

3 Sheets—Sheet 2.

No. 355,928.

Patented Jan. 11, 1887.



Chas. Buchheit.
Theodore L. Popp. } witnesses.

Claude C. Gould
Walton Smith } Inventors.
By Wilhelm O'Rourke. Attorneys.

3 Sheets—Sheet 3.

No. 355,928.

Patented Jan. 11, 1887.

Fig. 6.

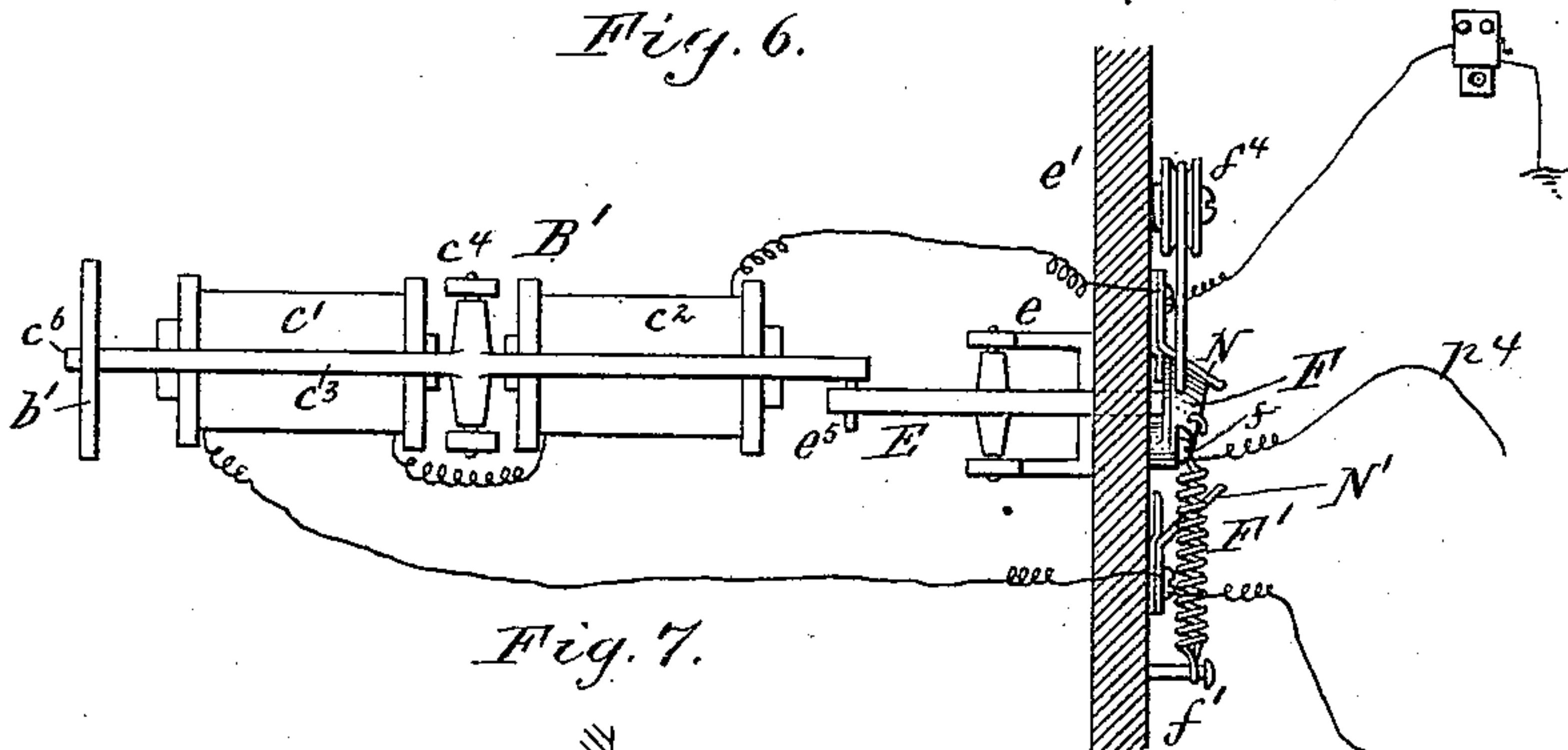


Fig. 7.

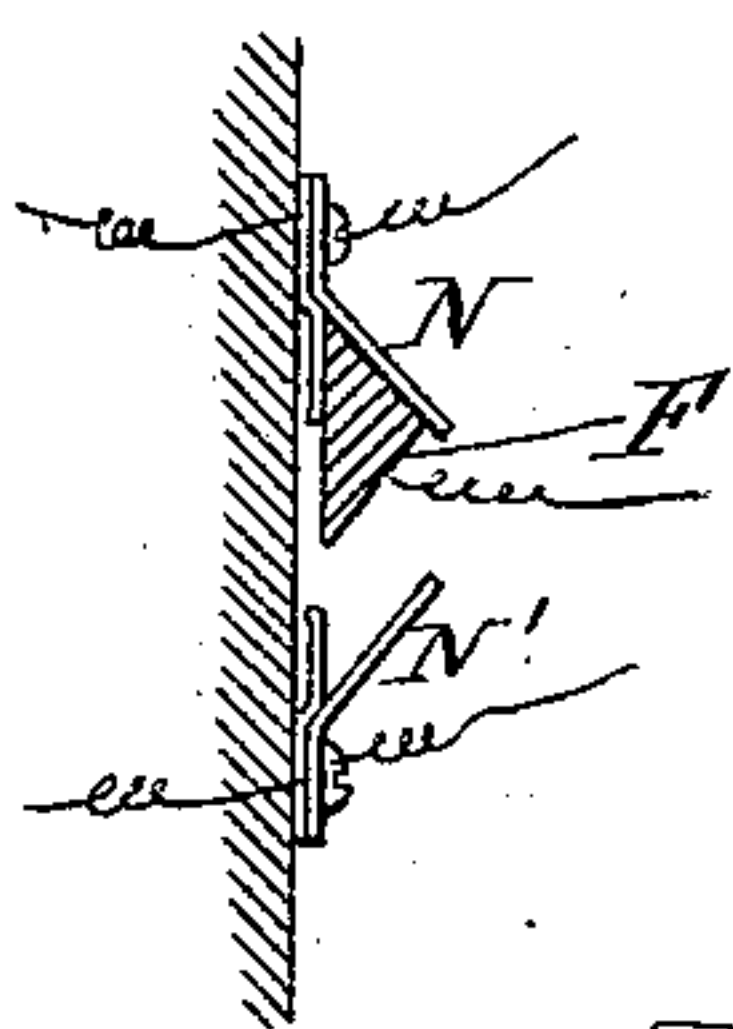


Fig. 8.

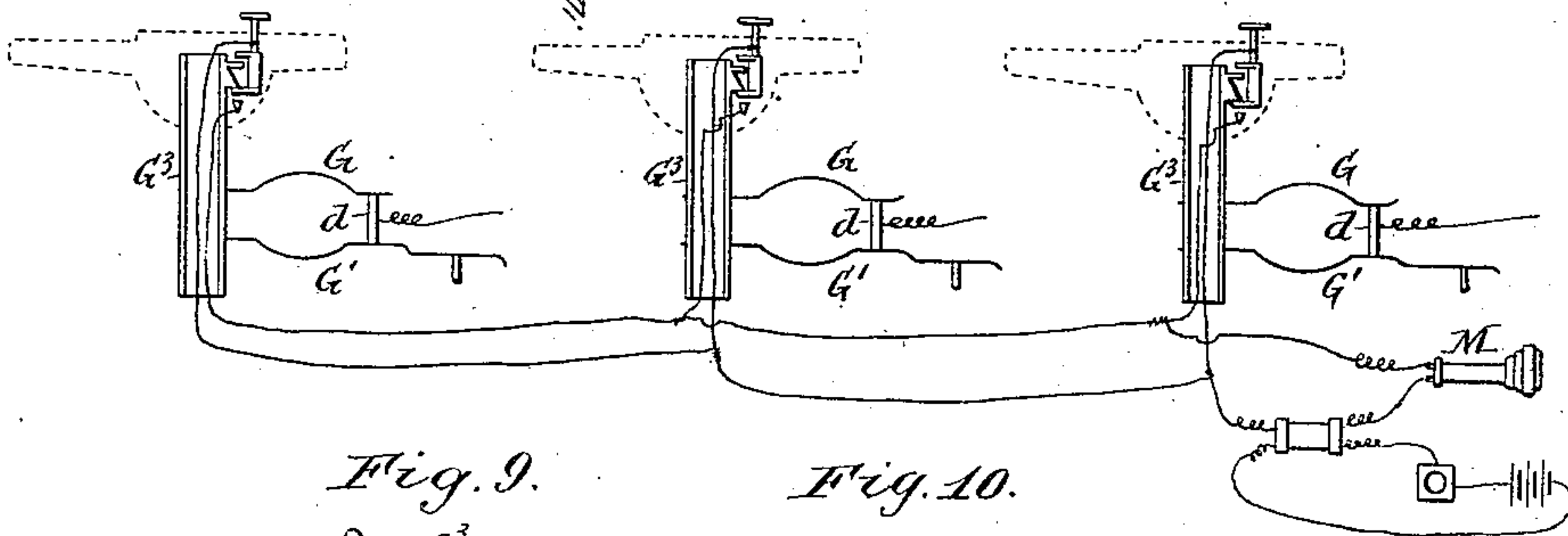


Fig. 9.

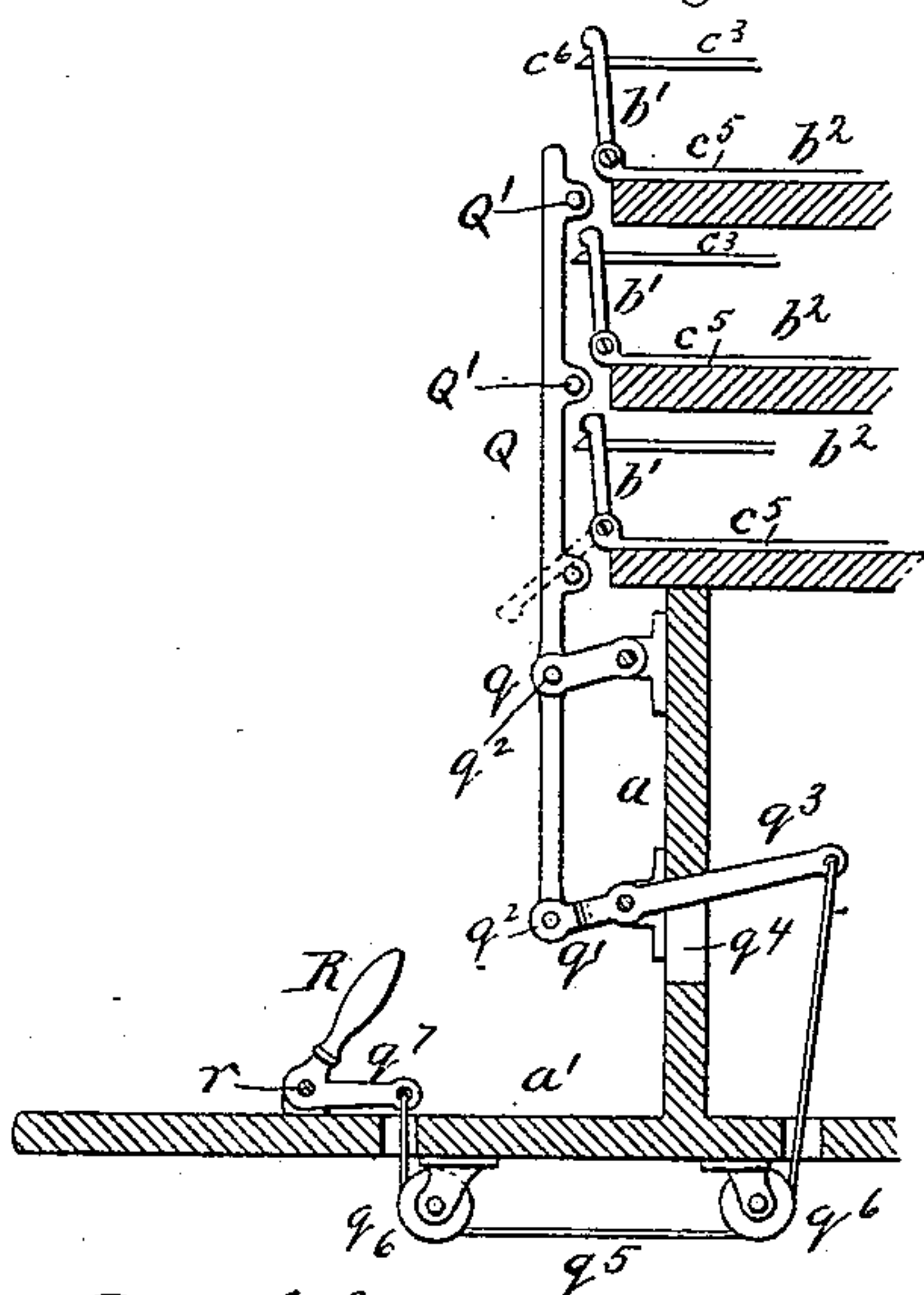
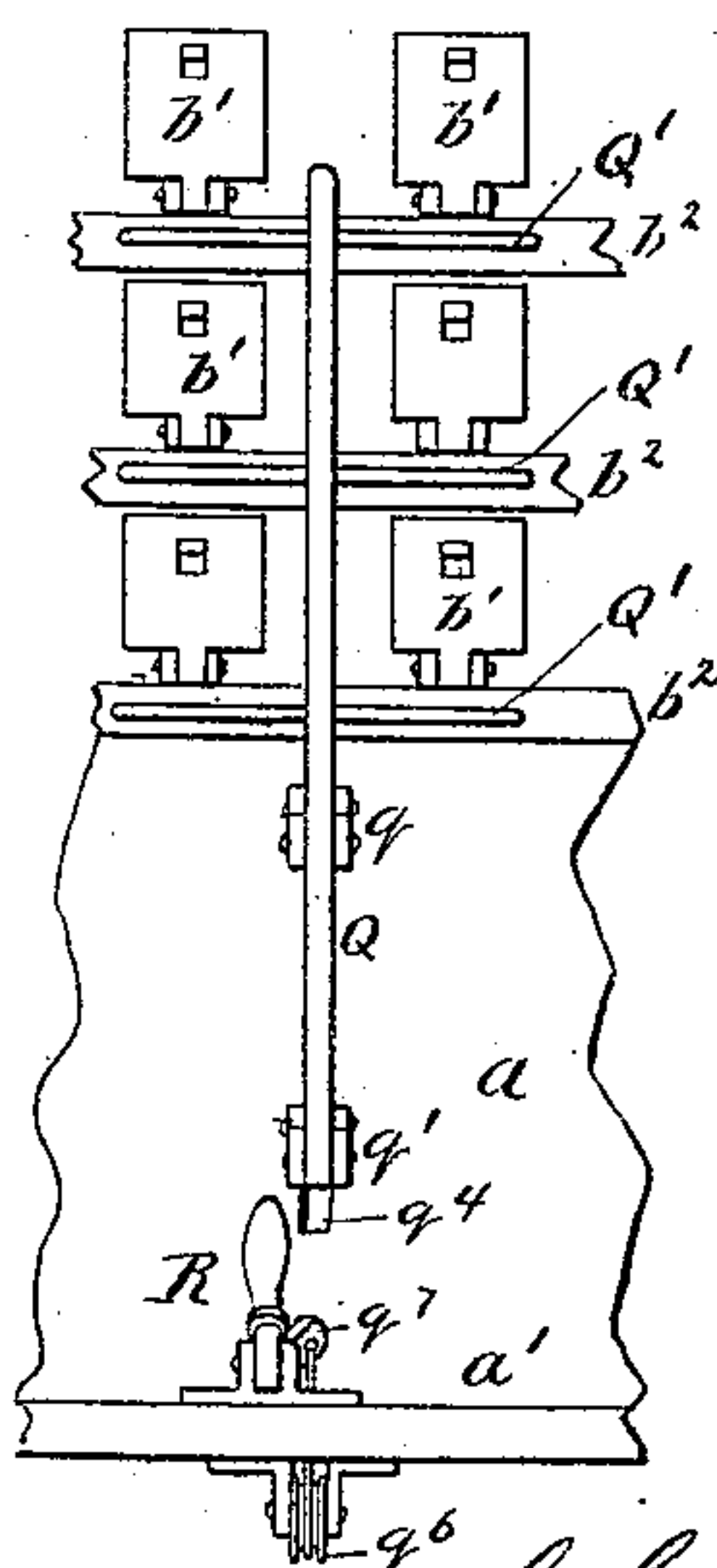


Fig. 10.



Chas. J. Buchheit.
Theodore L. Popp. } Witnesses.

96
L. C. Gould
W. Smith } Inventors
By Wilhelm F. Bonner
Attorneys.

UNITED STATES PATENT OFFICE.

CLAUDE C. GOULD, OF BUFFALO, AND WALTON SMITH, OF BATAVIA,
ASSIGNORS OF ONE-FOURTH TO PHILIP W. SCRIBNER, OF TONA-
WANDA, NEW YORK.

TELEPHONE SWITCH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 355,928, dated January 11, 1887.

Application filed February 23, 1886. Serial No. 192,755. (No model.)

To all whom it may concern:

Be it known that we, CLAUDE C. GOULD, of Buffalo, in the county of Erie and State of New York, and WALTON SMITH, of Batavia, in the county of Genesee and State of New York, have invented new and useful Improvements in Telephone Switch Systems, of which the following is a specification.

This invention relates to switch-boards for making connections between the various lines which terminate at the central office of a telephone-exchange.

The object of our invention is to provide means whereby the subscriber automatically breaks the ground-connection of his line at the central office, and leaves the line open until the operator closes the same, when the operator is enabled to speak to the subscriber, thereby placing in the hands of the subscriber means for determining with certainty whether his call has been received at the central office.

A further object of our invention is to provide means whereby the various subscribers on the section or table of one operator can be connected with each other without the use of cords, plugs, or other similar contrivances; also, to provide means whereby the subscribers on the section or table of one operator can reach or be reached by any subscriber at the central office more directly and more expeditiously than heretofore.

Our invention consists of the improvements, which will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, consisting of three sheets, Figure 1 is a diagram representing three sectional switch-boards of a central office provided with our improved system. Fig. 2 is a diagram representing the manner of connecting the subscribers on one section each with the other; and also how said subscribers are reached from any other section. Fig. 3 is a sectional elevation of one of the switch-levers, annunciators, and connecting parts. Fig. 4 is a sectional elevation in line *xx*, Fig. 3. Fig. 5 is a top plan view of one of the levers and connecting parts. Fig.

6 is a top plan view of the annunciator mechanism. Fig. 7 is a horizontal section in line *yy*, Fig. 3. Fig. 8 is a diagram showing the manner of connecting the levers of one section with the operator's listening-telephone. Fig. 9 is a sectional elevation of the mechanism for replacing the annunciator-aprons. Fig. 10 is a front elevation of the same.

Like letters of reference refer to like parts in the several figures.

A B C represent three sectional switch-boards arranged side by side, the upper portions, *a*, of which are preferably arranged vertically, or at right angles to the lower or table portions, *a'*, as represented in Fig. 3. Each table portion *a'* of the sections A B C is provided with a number of disks, D, equal to the number of subscribers' wires arranged upon said table. The disks D are preferably constructed of wood or other suitable non-conductive material, and are firmly secured in openings formed in the table portions *a'* in any suitable manner. The disks D are each provided with a ground contact-point, *d*, and an out or dead contact-point, *d'*. The latter are connected by means of cords *d²*, with plugs *d³*, seated in openings *d⁴*, formed in the vertical portions *a* of the sections A B C. The plugs *d³* are provided with a non-conductive knob, *a²*, whereby they may be manipulated, and a conductive or metallic portion, *a³*, with which the cords *d²* are connected.

B' represents the annunciators provided with the usual aprons or drops, *b'*, and arranged upon shelves or supports *b²* at the upper ends of the vertical portions *a* of the sections A B C.

c represents a downwardly-projecting armature arranged between the coils *c'* *c²* of the annunciator, and secured to or formed on the under side of a horizontal vibrating lever, *c³*, which latter is pivoted about midway of its length in vertical standards *c⁴*, secured to the bed-plate *c⁵* of the annunciator B'.

c⁶ represents a hook or projection formed on the upper side of the lever *c³* at its outer end. The hook *c⁶* engages over a shoulder, *c⁷*, formed in an opening, *c⁸*, in the apron *b'*, and

serves to hold the latter in an elevated position in the usual manner.

E represents a short horizontal lever arranged slightly above and on one side of the lever c^3 , and pivoted to a bracket, e , secured to the rear vertical wall, e' , of the switch-board. The opposite end of the lever E passes through an opening, e^2 , in the wall e' , and is provided at its outer upper end with an inclined nose, e^3 , arranged at right angles to the lever E, and engaging against a nose, e^4 , formed on the under side of a pivoted lever, F, as clearly shown in Fig. 4.

e^5 represents a short horizontal pin secured to the lever c^3 near its inner end and projecting at right angles thereto. The pin e^5 is adapted to engage against the under side of the inner end of the lever E and lift the latter when the armature C is vibrated, thereby releasing the hook e^3 from the lever F, and rendering the latter free to swing on its pivot f . The vibration of the lever c^3 at the same time releases the hook e^6 from the apron b' , and allows the latter to fall in the usual manner.

e^6 represents a spring secured at one end in the wall e' , and bearing with its free end against the under side of the lever E, to return the latter to its normal position after having been tipped by the lever c^3 . The lever E bears against the under side of the opening e^2 , thereby limiting its upward movement.

F' represents a coiled or other suitable spring secured at one end to the lever F, and at its opposite end to a pin, f' , secured to the rear side of the wall e' , and serving to throw the lever F in the direction of the arrow, Fig. 4, when the latter is released from the hook e^3 of the lever E.

f^2 represents a taut cord, preferably of catgut, secured at one end to the side of the lever F, opposite the spring F', and passing over rollers f^3 f^4 . The cord f^2 is secured at its opposite end to the arm f^5 of a horizontal bell-crank lever, F², which is pivoted to the under side of the table a' .

G G' represent two metal levers or springs, forming the terminal of the subscriber's line, and arranged respectively above and below the disk D. The levers G G' bear with their free ends against the upper and lower ends of the contact-points, with which they are placed in communication. As shown in Figs. 3 and 5, the levers G G' bear against the ground-point d , on opposite ends thereof, thus insuring a perfect contact between the parts, which is especially desirable when the parts are in their normal position. (Shown in Figs. 2, 3, and 5.) The inner ends of the levers G G' are provided with hubs g , which are secured by soldering, or otherwise, to a movable vertical metal tube, G³, so as to turn therewith.

G⁴ represents a wooden or other non-conductive hand-lever arranged above the disk D, and secured with its central enlargement to the vertical tube G³, so as to turn therewith. The hand-lever G⁴ is preferably provided with a handle, G⁵, to facilitate the manipulation of

the same. The tube G³ is arranged centrally in an opening in the disk D, and is held against vertical movement in the latter by the levers G G' and the hand-lever G⁴. The tube G³ projects upwardly through the hub of the lever G⁴, and terminates in a cavity or recess, G⁶, formed in the lever G⁴. The lever G', which is arranged underneath the disk D, is made somewhat longer than the upper lever, G, and is provided near its outer end with a downwardly-projecting pin or stud, g' .

When the armature c of the annunciator has been vibrated and the lever F and apron b' have been released, as above described, the lever F is moved in the direction of the arrow, Fig. 4, by means of the spring F', thereby drawing upon the cord f^2 of the bell-crank lever F² and causing the arm f^5 of the latter to strike against the pin g' of the lever G' and move the same and the lever G to the left, in the direction of the arrow, Fig. 5. By this means the movable terminal formed by the levers G G' is moved automatically by the current passing through the subscriber's wire in such manner as to break the ground-connection at the central office, thereby preventing the subscriber from signaling through the line until the line is again closed by the operator. As the levers F, G, and G' are moved simultaneously with the falling of the indicating-apron, a double notice is given to the operator that a subscriber has called. This movement of the levers G G' opening the subscriber's line notifies the subscriber that his call has been received at the central office by the fact that he can no longer ring his call-bell. If, therefore, the subscriber's line should be crossed and the call be not received at the central office, it will be apparent to the subscriber at once, because he can continue to ring his call-bell, and he will be at once informed by this fact that his line is out of order. Should the apron b' fail to fall, from bad adjustment or any other cause, when the armature is vibrated, the call is made known to the operator by the lever G moving off the ground-point d on the subscriber's disk D.

g^2 represents a ring or annular flange formed on the under side of the disk D, and forming a way for the lever G' to ride over when being moved from one contact-point to another.

H represents a step-shaped disk or pulley of non-conductive material secured to the lower portion of the tube G³, so as to turn therewith, and provided with a series of annular metal plates or rings, h h' h^2 h^3 , secured thereto in any suitable manner. i i' i^2 i^3 represent stationary metal springs or contact-points secured to a cross-piece, i^4 , underneath the table a' , and bearing with their free ends against the under side of the rings h h' h^2 h^3 , respectively. By this construction a uniform contact is maintained between the parts when the hand-lever G⁴ is moved to any point on the disk.

I represents the push-button of the operator's listening-telephone arranged above the lever G⁴, and provided with a downwardly-

projecting metallic stem, j , moving in an opening in the upper end of the lever G^4 . The button I is provided near its lower end with two contact-points, j' j^2 , which are separated by a non-conductor, j^3 .

j^4 represents a spiral spring arranged between the button I and the lever G^4 , whereby the button I is held in an elevated position, thereby causing the lower contact-point, j^2 , to bear against the under side of a projecting nose or contact-point, j^5 , formed on the tube G^3 . The point j^2 of the button I is connected with the line k by means of a wire, j^6 , ring h' , and contact-spring i' .

K represents the generator push-button, which is provided with a metallic stem, l , moving through an opening in the lever G^4 , and which is provided at its lower end with a contact-plate, l' .

l^2 is a small flat spring, which serves to hold the button K in an elevated position ready for use.

l^3 represents a concave metallic disk seated in a corresponding recess in the lever G^4 , and made to conform to the metallic convex lower portion, l^4 , of the button K, so as to form a reliable contact between the parts when the button K is depressed.

l^5 represents a projecting nose or contact-point, provided preferably with a flat upper surface, and formed on the metallic tube G^3 below the contact-plate l' . The metallic disk l^3 is connected with the generator by means of the line l^6 , ring h , spring i , and wire k^2 .

m represents a metallic contact-point secured in the lever G^4 in any suitable manner, and connected with the operator's listening-telephone M by a wire, m' , ring h^2 , spring i^2 , and wire m^2 . The return-wire m^3 of the listening-telephone is connected with the contact-point j' of the stem j by means of a wire, m^4 , ring h^3 , and spring i^3 .

m^5 represents a contact-point formed on the tube G^3 , above the nose j^5 , and below the contact-point j' of the button I, and adapted to receive the point j' when the button I is depressed and form a contact therewith. It will thus be seen that upon depressing the push-button I, so as to make a contact between the points j' and m^5 and the points j^2 and m , the operator's listening-telephone M is looped in on the main circuit without interposing a ground-wire between the two connected subscribers.

N N' represent two metal contact-points secured to the rear wall, e' , and preferably made V-shaped, as shown in Fig. 7, to correspond with the inclined sides of the lever F and insure a more perfect contact between the parts.

The contact-points N N' are arranged on opposite sides of the lever F, as shown in Figs. 2, 6, and 7, so that when the lever F is held in its normal position by the lever E the subscriber's line n enters the central office through the contact-point N to and through the annunciator B', to the contact-point N', wire k , spring i' , ring h' , to the wire j^6 , contact-points

j^2 j^5 , metal tube G^3 , levers G G', and to the ground-point d on the subscriber's disk D.

Each disk D is provided with as many local contact-points p as there are remaining subscribers on the section upon which said disk is arranged, and each contact-point on the various disks is numbered to correspond with the number of the subscriber's disks with which it is connected. For instance, subscriber's disk No. 1 is provided with two local contact-points, p , numbered 2 and 3. Subscriber No. 2 has a similar number of contact-points, which are numbered 1 and 3, and the contact-points of subscriber No. 3 are numbered 1 and 2. Thus, if subscriber No. 1 calls and thereby releases the apron b' and lever F, the latter moves the levers G G' on disk No. 1, as above described, and the operator turns the levers G G' back to the ground-point and ascertains that the subscriber wants, for instance, No. 2. The operator then turns the levers G G' on No. 1 subscriber's disk by means of the hand-lever G^4 to contact-point p No. 2, which movement returns the lever F to its normal position by the crank F^2 and cord f^2 . The point p No. 2 on disk No. 1 is now connected by the wire n^2 with the contact-point N of annunciator No. 2. The operator now presses the generator-button K on disk No. 1, which causes the armature of annunciator No. 2 to vibrate and release its apron b' and lever F in the same manner as in the case of No. 1 subscriber's call, thereby automatically removing the levers G G' on No. 2 disk from ground-point d , as above described. This movement rings both subscribers' bells, notifying them that the connection between them is completed. It will thus be seen that the operator performs the same service for the called subscriber which the calling subscriber performs for himself—that is, the call of the operator automatically breaks the ground-connection of the called subscriber's line at the central office, and removes the ground-connection between the connected subscribers. Subscribers Nos. 1 and 2 are now connected through the levers G G' on No. 1 disk, as above described, to contact-point No. 2, disk No. 1, wire n^2 , contact-point N of No. 2 drop, and main line n to No. 2 subscriber. Subscribers Nos. 1 and 2 having been thus connected the operator replaces the fallen aprons of Nos. 1 and 2 annunciators, ready to be rung off. By thus replacing the apron of No. 1 annunciator the lever F is again released and assumes the same position as the lever F of No. 2 annunciator. When the subscriber rings off, the apron of No. 1 annunciator falls, the operator again replaces the same and turns the levers G G' on disk No. 2 to the ground-point d , which movement again replaces the lever F in its original position, ready for another call. The operator also turns the levers G G' on disk No. 1 in the direction of the arrow on said disk to its ground-point d , completing the circle, which movement likewise replaces the lever F of No. 1 annunciator, ready for another call. By con-

necting the various subscribers on one section in this manner we dispense entirely with the use of the usual plugs, cords, &c., for effecting a local connection, thereby making the desired connections rapidly and with a great degree of certainty.

P represents a series of contact-points permanently connected to corresponding points on the other boards, and arranged in rows in the vertical portions a of each of the sections A B C. The number of contact-points P on each section correspond with the number of subscribers on every other table. For example, section A has numbers 4, 5, 6, 7, 8, 9, as this section can reach numbers 1, 2, and 3 locally. Section B has numbers 1, 2, 3, 7, 8, 9, and section C has numbers 1, 2, 3, 4, 5, 6, their own local number not being represented in the contact-points P, as they are likewise enabled to reach their individual subscribers in the same manner as section A.

The contact-points P are preferably each constructed of a metallic tube, p , inserted through an opening in the vertical portion a of the section, and provided at its inner end with an external screw-thread, over which engages an internally-screw-threaded nipple, p' . The tube or sleeve p is provided with a shoulder, p^2 , so that upon tightening the nipple p' the parts are firmly held in place. The sleeve p is provided with two V-shaped metal contact points or springs, which are secured in place by soldering, or otherwise, and which serve to firmly secure the plugs d^3 in place and form a contact therewith when the latter are inserted in the contact-points P.

p^4 represents a wire or other suitable connection, which is secured at one end to the automatic lever F of each annunciator B', and which is connected with the nipple p' of each contact-point P throughout the system, numbered to correspond with the annunciator from which it emanates.

Thus it will be seen that the various subscribers in a central office are practically grouped within reach of each operator on each of the sections A B C, whereby we dispense with the use of checks and speaking-circuits between the various operators at the central office, and whereby the desired connections are effected more rapidly and with greater convenience and certainty than heretofore.

Q represents a vertical rod or lifting-bar arranged in front of each of the sections A B C, and provided with horizontal arms Q', which are adapted to replace the indicating-aprons b' when required.

q q' represent short links pivoted in suitable bearings in the frame a , and pivoted at q^2 to the bar Q. The lower link, q' , is provided with an arm, q^3 , extending rearwardly through an opening, q^4 , in the frame a , and resting against the upper end of this slot, which thereby holds the rod Q in its normal position.

q^5 represents a cord running over pulleys q^6

and connected at one end to the arm q^3 and at its opposite end to an arm, q^7 , of a hand-lever, R, which latter is pivoted at r in a suitable bearing arranged on the horizontal portion a' of the section. Upon moving the handle R in the proper direction the lifting-bar Q is caused to move upwardly and inwardly, thereby replacing all of the fallen indicator-aprons simultaneously. The cross-bars Q' also serve to support the fallen aprons b' .

The operation of our improved switch system is as follows: When, for example, subscriber No. 1 calls the central office through the line n and ground-point d , as before described, the vibration of the armature c releases the apron b' and the lever F, which latter is drawn away from the contact-point N to the contact-point N' by the coil-spring F'. This movement of the lever F causes the levers G G' to move to the left by means of the cord f^2 and bell-crank lever F², thereby breaking the connection with the ground-contact point. The operator now moves the levers G G' back to the ground-point d , thus throwing the lever F back to contact-point N and in engagement with the hook e^3 of the lever E by the pin g' of the lever G' striking against the arm f^6 of the bell-crank F² and moving the latter back to its original position, as shown in Fig. 5. The operator now presses the push-button I, which loops in the listening-telephone M, and ascertains that the subscriber wants, say, No. 9. The operator then turns the levers G G' back to contact-point d' and inserts plug d^3 of disk No. 1 in contact-point P No. 9, which is connected by means of the wire p^4 with the lever F of annunciator No. 9. The operator now presses the generator-button K on disk No. 1, thus ringing through wire p^4 , lever F of annunciator No. 9, to contact-point N, to and through said annunciator No. 9 to the levers G G' on No. 9 subscriber's disk. The vibration of armature No. 9 releases the lever F of said armature and moves the levers G G' on said disk in the same manner as in the case of No. 1 subscriber's first call, thus completing the connection and ringing both subscribers' bells simultaneously. Subscribers Nos. 1 and 9 are now connected through the cord d^2 and contact-point P No. 9 of section A with the lever F, contact-point N, annunciator B', contact-point N, and main line n of section C by means of the wire p^4 . The operator now pulls on the hand-lever R, replacing No. 1 apron ready to be rung off. It will be seen that in making this connection between Nos. 1 and 9 the apron b' of No. 9 annunciator on the table C has fallen simultaneously with the movement of the levers G G' on No. 9 disk, which indicates to the operator on this section that No. 9 has called. This operator then moves the levers G G' of disk No. 9 back to the ground-point d , loops in the listening-telephone, and finds No. 9 is in use by some other operator. The operator then moves the levers G G' back to their former po-

sition and replaces the apron *b'* of No. 9 annunciator by means of the lever *R*, which leaves the apron ready to be rung off.

All electrical disturbances—such as electric light currents entering the line by crossing, lightning, or other electrical currents which may influence the main line sufficiently to cause the armature *c* to vibrate—will be instantly arrested by the lever *F* moving the levers *G G'* off the ground-point *d*, thereby opening the line and insuring the system against fire.

The levers or fingers *G G'* constitute the movable terminal, which is automatically moved out of its normal position by the current passing through the line. The lever *F* constitutes the terminal actuator, which is set in motion by the current passing through the line, and which moves the terminal out of its normal position. We do not wish to limit ourselves to the specific mechanical construction of these devices, because they can be changed without departing from the spirit of our invention. For instance, while the automatically-movable terminal has in the present application a turning movement about a vertical axis, it has in another application filed by us September 2, 1886, Serial No. 212,450, a rectilinear movement, and while the terminal actuator is composed of a pivoted lever in the present application it is composed of a reciprocating-bar in said subsequent application.

We are aware that it is not new to disconnect the line automatically from the ground and connect it by the same operation with the operator's telephone, and we do not claim such a construction of the switch system.

We do not wish to claim in this application any improvement which is claimed in another application filed by us September 2, 1886, Serial No. 212,450.

We claim as our invention—

1. In a switch-board system, the combination, with the main line, of a movable terminal, and a line-opening mechanism, substantially as described, whereby the terminal is automatically moved to open the line, and is held open upon a current passing through the line, substantially as set forth.

2. In a switch-board system, the combination, with the main line, of a ground-point, a movable terminal, and a line-opening mechanism, substantially as described, whereby the terminal is automatically moved from the ground-point and held out of contact, thereby holding the line open until it is closed by the operator, substantially as set forth.

3. In a switch-board system, the combination, with the main line and its annunciator, of a movable terminal, an actuating-lever connected with said terminal, and a stop connected with the annunciator and releasing the actuating-lever automatically upon a current passing through the line, substantially as set forth.

4. In a switch-board system, the combination, with the main line, of a movable terminal,

an actuating-lever, *F*, a stop-lever, *E*, whereby the lever *F* is locked in position, an armature and coil, whereby said stop is released, and mechanism, substantially as described, whereby the actuating-lever *F* is connected with the movable terminal, substantially as set forth.

5. The combination, with a movable terminal and a lever, *F*, interposed between two contact-points, *N N'*, of the main circuit, of the annunciator mechanism, whereby the lever *F* is held in contact with one of said main-line contact-points when in its normal position, and a tension device, *F'*, whereby the lever *F* is automatically moved from the contact-point *N* to the contact-point *N'*, when it is released by said annunciator mechanism, substantially as set forth.

6. In a switch-board system, the combination, with the movable terminal levers *G G'*, bearing on opposite sides of the ground-point when in their normal position, and a movable tube, *G³*, connecting said levers, of a movable lever, *F*, connected with the annunciator mechanism, a bell-crank lever, *F²*, and a cord, *f²*, connecting said bell-crank with the lever *F*, and adapted to move the levers *G G'* from their normal position when the lever *F* is released, substantially as set forth.

7. The combination, in a switch-board system, of a pivoted lever, *F*, arranged between two contact-points of the main circuit and provided with a nose, *e⁴*, adapted to engage with a lever, *E*, whereby the lever *F* is held in its normal position, an armature-lever, *c³*, adapted to engage against said lever *E* and release the lever *F* when said armature-lever is vibrated, and an apron, *b'*, adapted to engage over a nose or hook, *c⁶*, of the armature-lever, and which is simultaneously released with the lever *F* by the vibration of said armature-lever, substantially as set forth.

8. The combination, in a switch-board system, of a non-conductive disk provided with a ground-point, *d*, a movable conductive tube, *G³*, arranged centrally in said disk, levers *G G'*, connected with said tube and forming a contact with the ground-point *d* when in their normal position, and mechanism, substantially as described, whereby said levers *G G'* are moved automatically from the ground-point, substantially as set forth.

9. The combination, in a switch-board system, with a series of non-conductive disks, *D* each provided with a ground-point, *d*, dead contact-point *d'*, and local contact-points *p*, of lines *n²*, connecting said points *p* with the corresponding points on every other disk on the same section or table, a movable conductive tube, *G³*, forming part of the circuit and arranged centrally in each of said disks, and levers *G G'*, connected with said tubes *G³*, and forming a contact with the ground-point *d* when in their normal position and with either the out-point *d'* or one of the local out-points *p* when moved out of their normal position, substantially as set forth.

10. In a switch-board system, the combination, with a disk, D, of a movable conductive tube, G³, arranged centrally in said disk, levers G G', secured to said tube and adapted to come in contact with a series of contact-points arranged upon said disk, and a non-conductive disk, H, secured to the tube G³ and provided with a series of annular contact-surfaces, h h' h² h³, and stationary contact-points i i' i² i³, bearing respectively against said annular surfaces h h' h² h³, and wires l⁶ j⁶ m⁴ m', whereby said annular surfaces are connected with their respective terminal points, substantially as set forth.

11. In a switch-board system, the combination, with a disk, D, provided with a series of contact-points, d, d', and p, of a tube, G³, arranged centrally in said disk, levers G G', connected with said tube and adapted to engage with said contact-points, the annular contact-surfaces h h' h² h³, attached to said tube, so as to move therewith, and a hand-lever, G⁴, substantially as set forth.

12. In a telephone switch-board system, the combination, with the terminal levers G G', tube G³, having contact-point m⁵, and the telephone M, of the push-button I, having contact-points j' j², adapted to engage with the contact-point m⁵ and a contact-point, m, respectively, when the button is depressed, whereby the telephone M is looped in on the main circuit, substantially as set forth.

13. In a telephone switch system, the combination, with the hand-lever G⁴, metallic conductive tube G³, and terminal levers G G', of a metallic disk, l³, formed in the hand-lever and connected with the generator, a push-but-

ton, K, provided with a contact-point, l', adapted to engage with a stationary nose, l⁵, of the tube G³, when the push-button is depressed, and connect the generator with the main circuit, substantially as set forth.

14. In a telephone switch system, the combination, with the terminal levers G G' and tube G³, having the contact-point j⁵, of a button I, provided with a contact-point, j², engaging against the point j⁵ of the tube G³, substantially as set forth.

15. In a switch system, the combination, with the disks D, levers G G', tubes G³, and contact-points d', of plugs d³, connected with said contact-points d', and a series of openings, d⁴, adapted to receive said plugs when the same are not in use, substantially as set forth.

16. In a switch board system, the combination, with two or more boards or sections, A B C, each of which is provided with local contact-points d', of plugs d³, connected with said contact-points d', a series of through contact-points, P, arranged upon each section, and numbered to correspond with the local contact-points on every other section, and wires p⁴, connecting each annunciator with every contact-point P on each table or section which corresponds with the number of the annunciator from which said wire p⁴ emanates, substantially as set forth.

Witness our hands this 18th day of February, 1886.

CLAUDE C. GOULD.
WALTON SMITH.

Witnesses:

JNO. J. BONNER,
CARL F. GEYER.