

No. 638,471.

Patented Dec. 5, 1899.

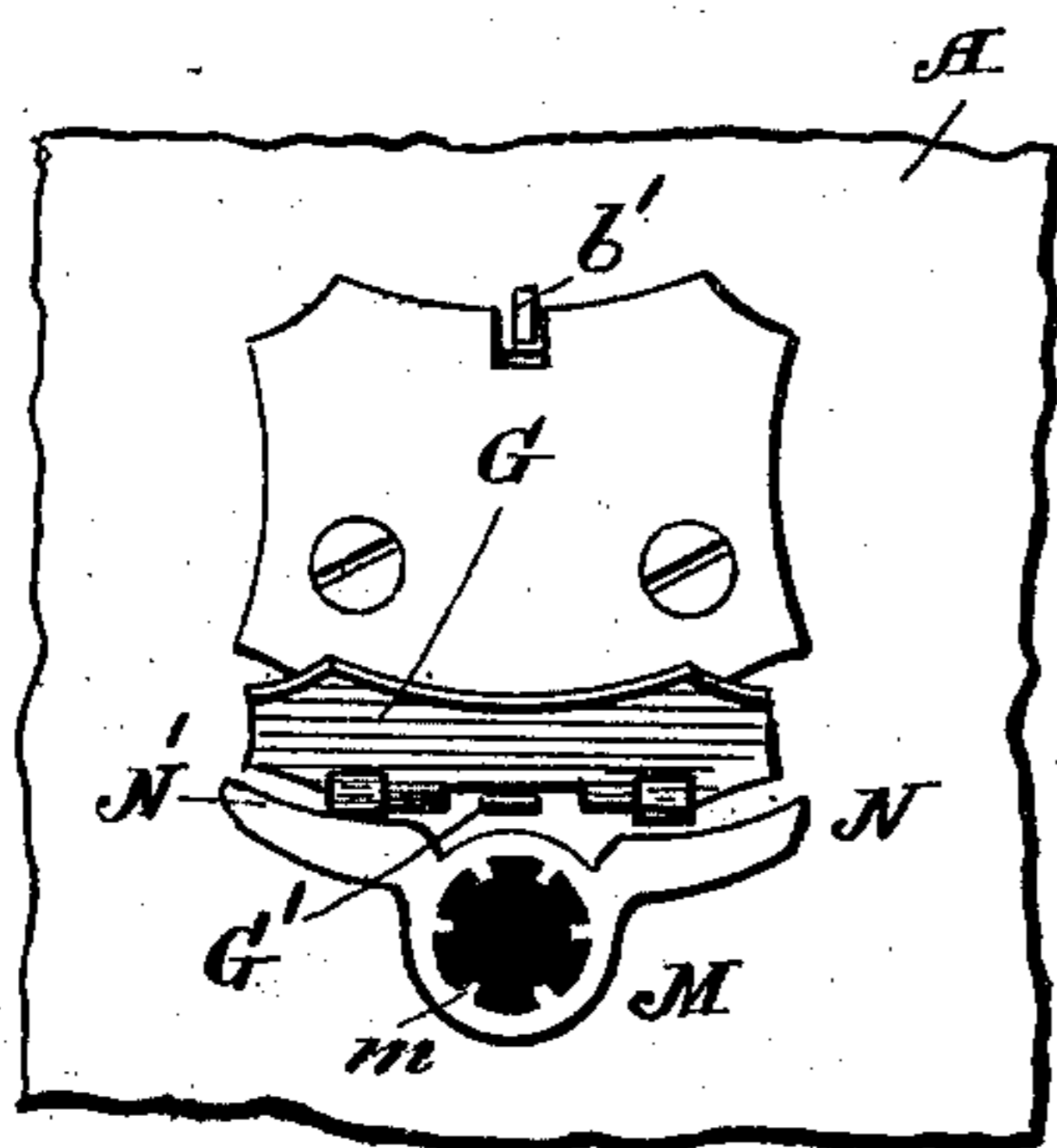
S. B. RAWSON.
TELEPHONE SWITCH.

(Application filed Dec. 15, 1897.)

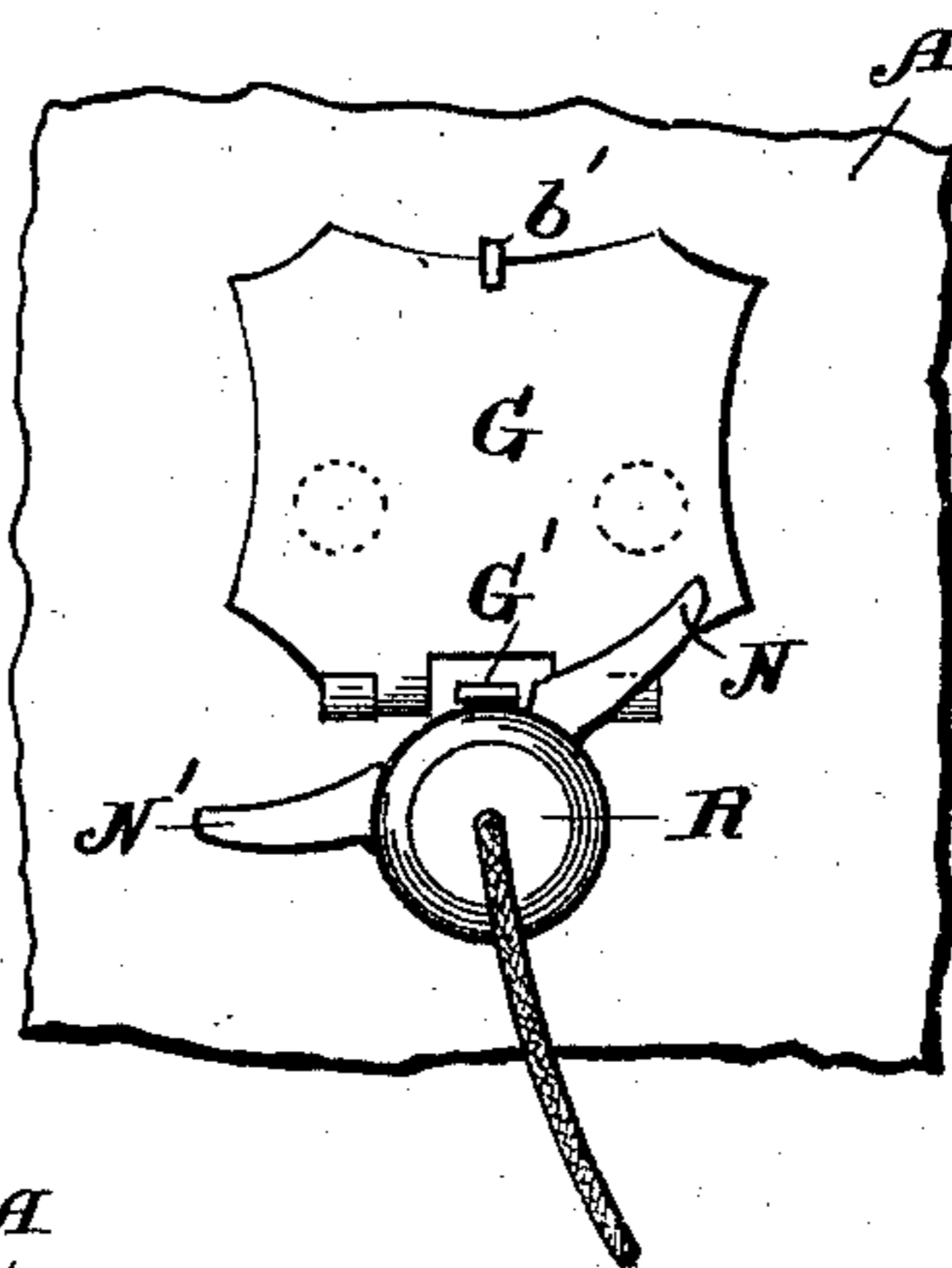
(No Model.)

2 Sheets—Sheet 1.

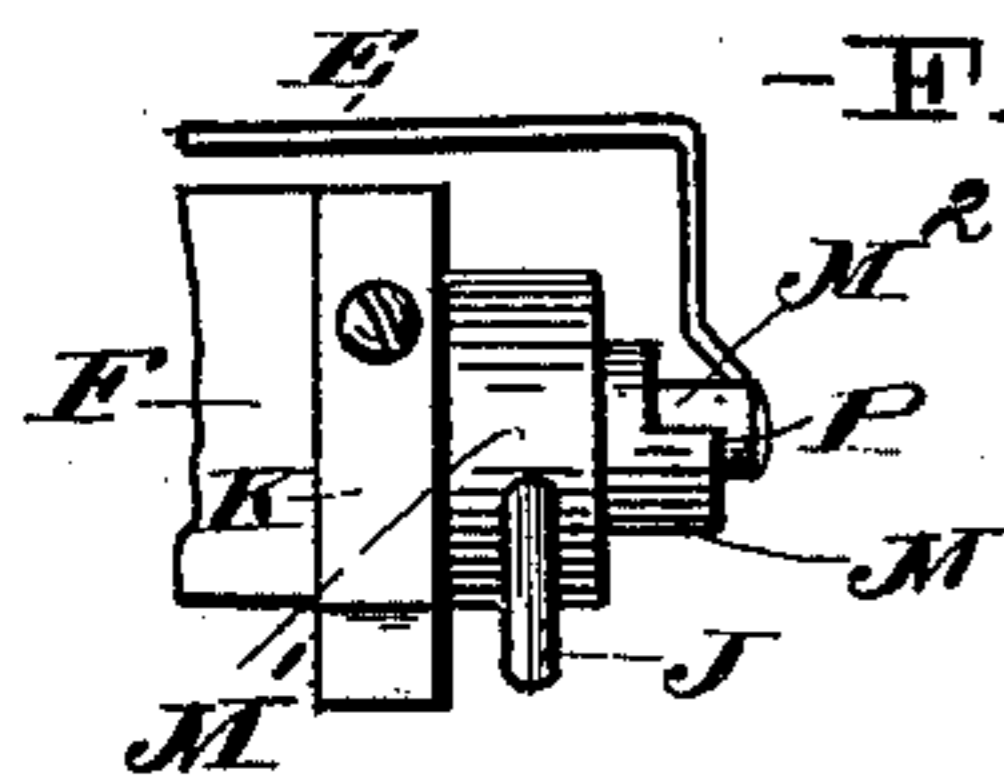
-FIG. I-



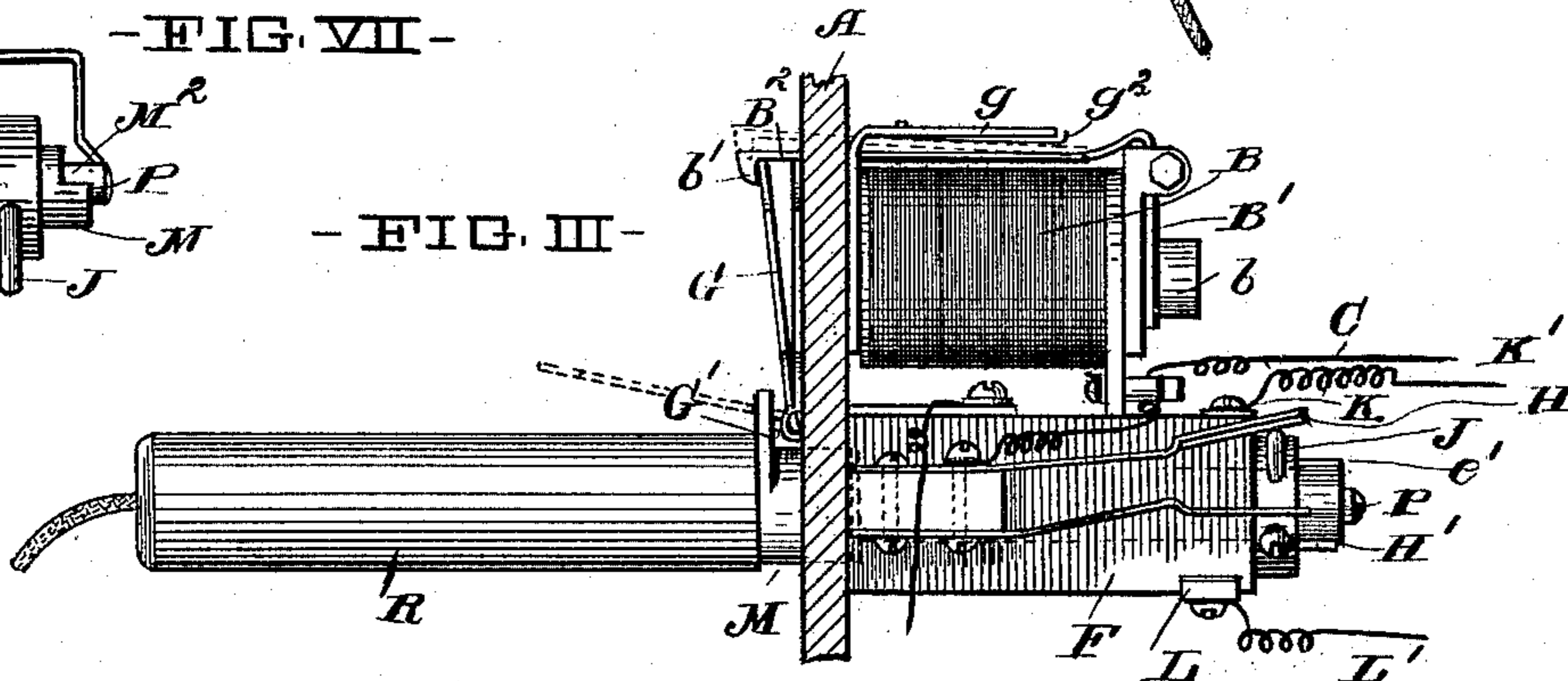
- FIG. II -



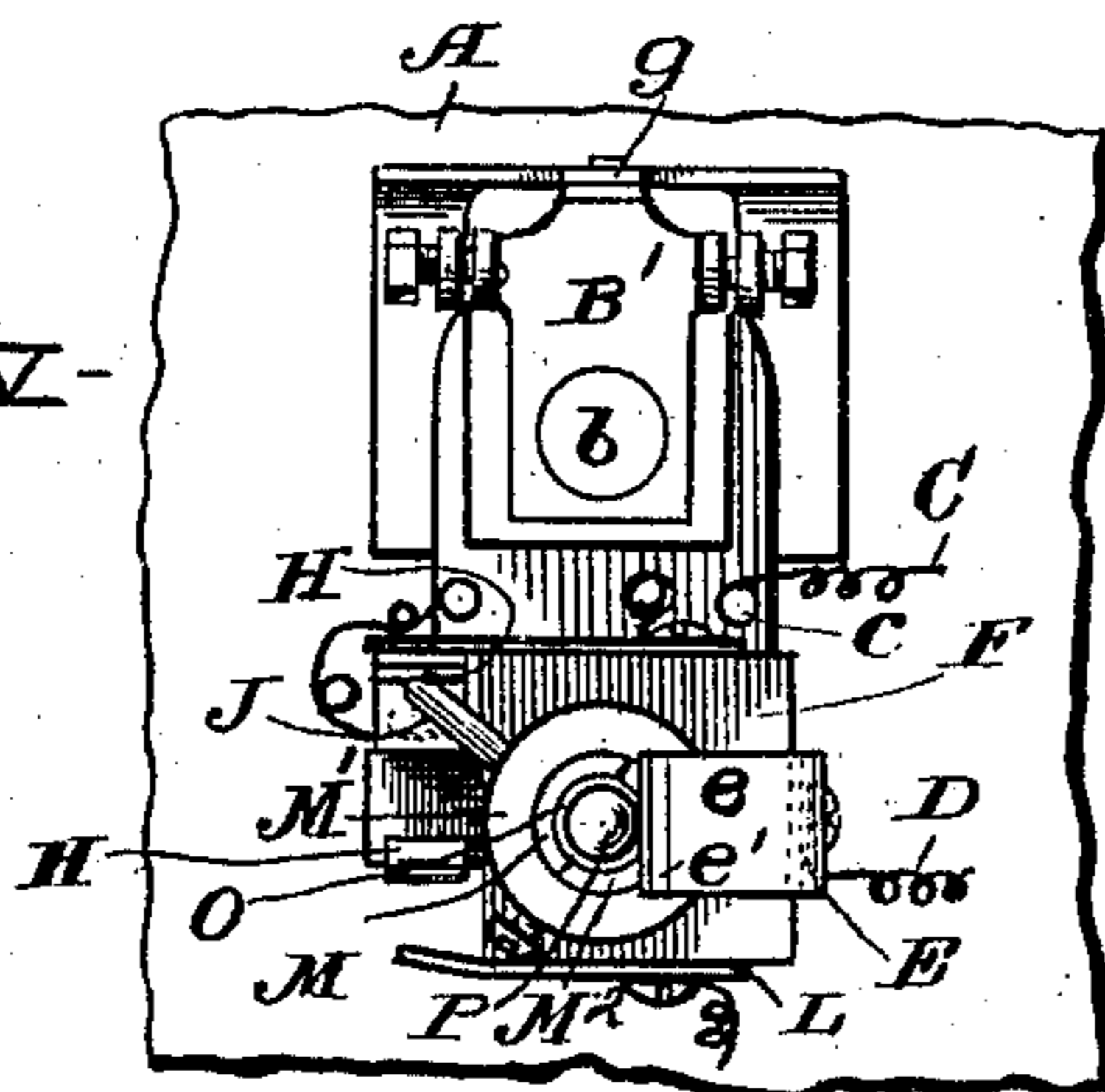
-FIG. VII-



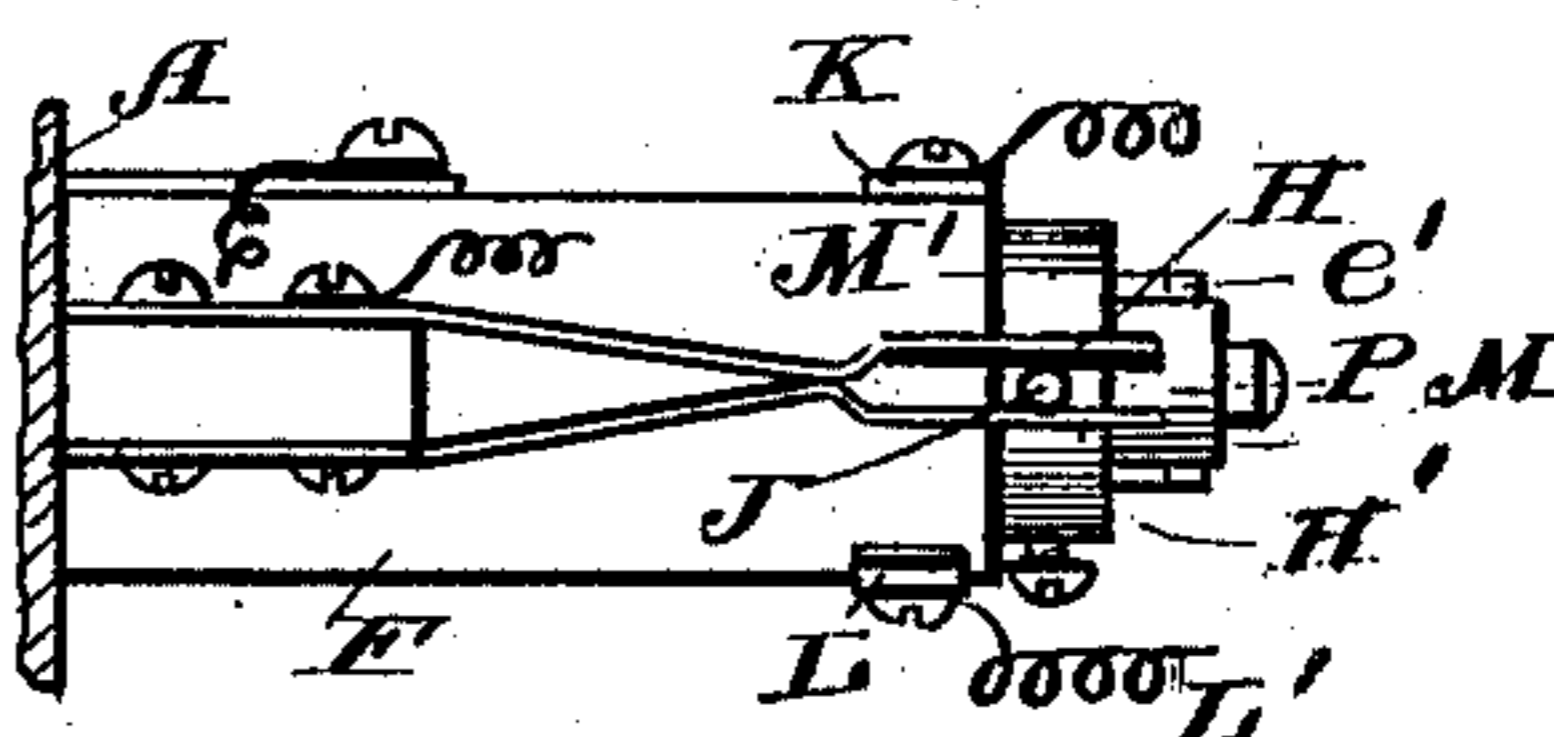
- FIG. III -



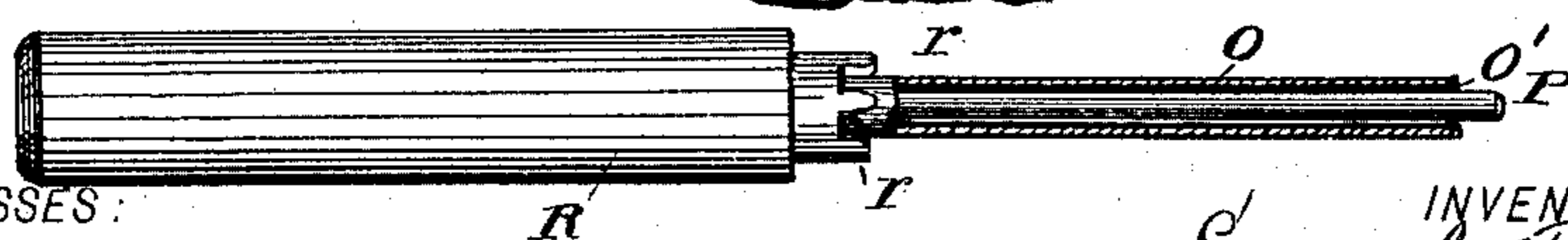
-FIG. IV-



- FIG. VI -



-FIG. V-



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No. 638,471.

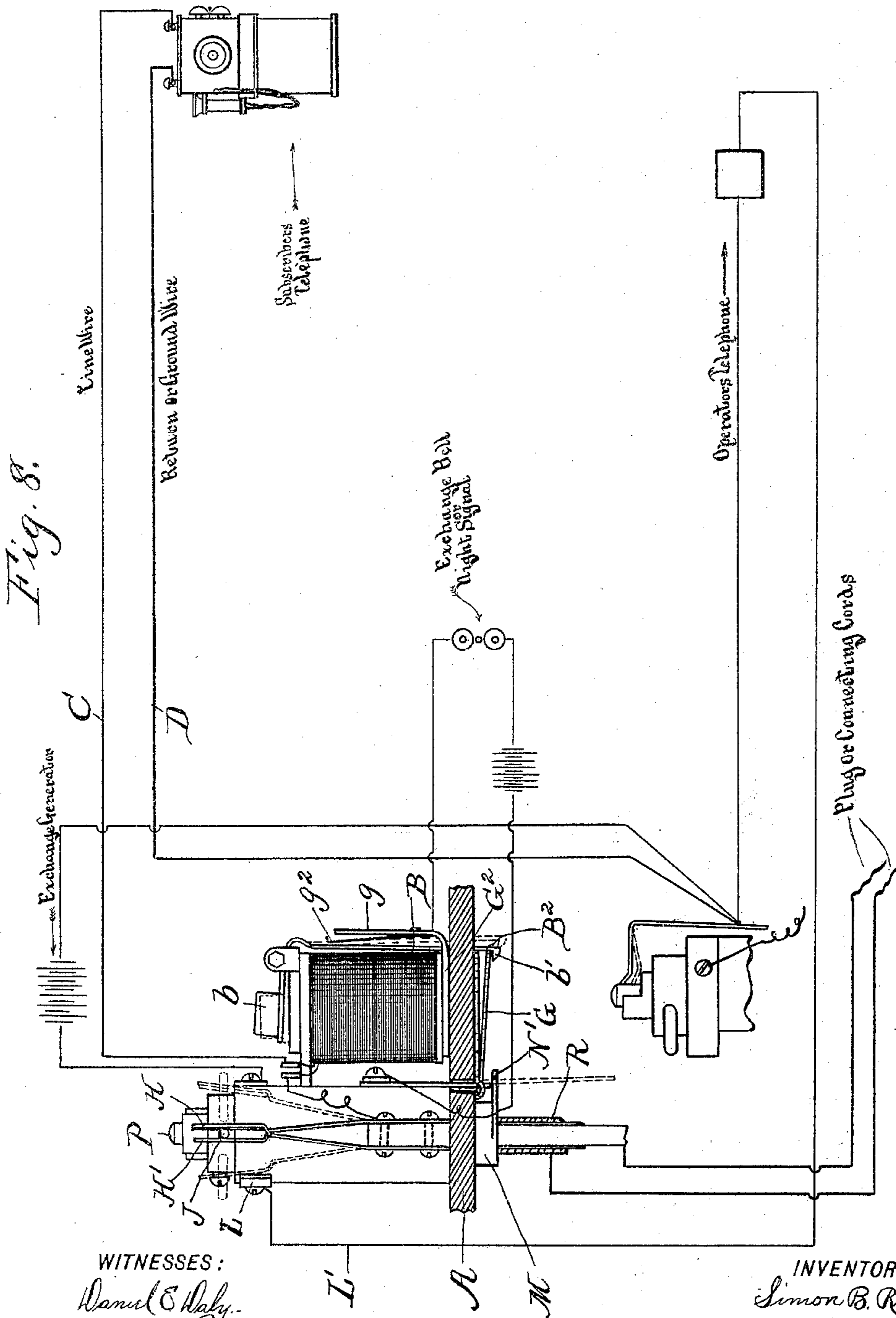
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2 Sheets—Sheet 2.



UNITED STATES PATENT OFFICE.

SAMUEL B. RAWSON, OF ELYRIA, OHIO, ASSIGNOR TO THE RAWSON ELECTRIC COMPANY, OF SAME PLACE.

TELEPHONE-SWITCH.

SPECIFICATION forming part of Letters Patent No. 638,471, dated December 5, 1899.

Application filed December 15, 1897. Serial No. 661,943. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL B. RAWSON, of Elyria, Lorain county, Ohio, have invented certain new and useful Improvements in Telephone-Switches; 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 pertains to make and use the same.

My invention relates to so-called "plug-switches" for connecting one electric circuit with another, and is more especially designed for use in connection with telephone-lines and switchboards, whereby connections, either local or line, can be made and broken at any time, the contact-points being formed of electric conducting material and in turn connected to the different lines forming or constituting the main or local circuits and embodying either the local generator and local telephone of the exchange or the telephones and signals of the subscribers and also the local signal of the exchange.

The object of my invention is to so construct the plug-switch that the insertion of the plug and the manipulation of the same by the operator at the exchange will act for the purpose of switching in the local telephone and at the same time causing the signal to resume its normal condition or position, and also by further manipulating the plug, as hereinafter set forth, to call up the subscriber and switch in connection between the subscribers desiring connection one with the other, all of which will be hereinafter fully set forth and claimed.

In the drawings, Figure I is a view in front elevation of a plug-switch constructed according to my invention, showing the signal or shutter in signaling position or in-dropped position. Fig. II is a view in front elevation of a plug-switch, illustrating the same with the shutter up and in normal position and showing the plug inserted and manipulated so as to turn in the local or exchange generator to signal or call the subscriber. This view also shows the manner in which the shutter-signal is returned to its normal position by the plug. Fig. III is a view in side elevation of a section of a switchboard, illustrating my improved plug-switch in side elevation and showing the plug turned to the position indi-

cated in Fig. II for turning on the generator to send the signal to the subscriber. Fig. IV is a view in rear elevation of a portion of a switchboard, also illustrating in rear elevation the construction of my improved plug-switch. Fig. V is a longitudinal vertical section taken through the switch-plug. Figs. VI and VII illustrate the different positions of the parts as they are assumed when manipulating the device. Fig. VIII is a diagram illustrating the circuit connections employed with my improvement.

A represents a section of a switchboard to which is properly secured an electromagnet B. This electromagnet B is normally included in the subscriber's circuit, which consists of the main-line wire and the ground or return wire and includes the electric generator at the subscriber's telephone. These line and return or ground wires are indicated in the drawings by letters C and D, respectively. The line-wire C passes directly to and includes the electromagnet B by being attached in this case to a pin or post c, which in turn is electrically secured to the wire of the magnet. The line D, which is the return or ground line of the circuit, is secured to a spring contact-bar E. The spring-bar E is secured to a block F, of suitable insulating material, and has its forward or free end e turned at approximately a right angle and provided with an outturned or beveled lip e', the function of which will be hereinafter set forth.

B' represents a pivoted armature provided at its lower end with a weight b. The armature B' is provided at its upper end with an arm B², having in turn at its outer end a nose or catch b'. The nose or catch b' normally engages a shutter G, which constitutes the signal, and indicates to the operator (by dropping) that a subscriber is calling and wishing service. The shutter G is released by causing an electric current to pass through the magnet B, thus causing the armature B' to be attracted and the arm B² to be raised sufficiently to allow of the nose b' freeing the shutter G, when it drops by its own gravity.

G' indicates a contact-point having electrical connection to one line of the night-signal, which is located in the exchange and generally consists of a bell or gong included

in a local circuit at the exchange. In order to establish this circuit by the dropping of the shutter G, the other wire forming a part of the circuit, including the night-signal, is connected to a plate G², the plate G² being connected to the switchboard and having an arm *g* extending over the arm B² of the armature B'. A contact-spring *g*² is preferably secured to the under side of the arm *g*, thus making electrical connection between said arm B² and arm *g* and establishing the circuit through the night-signal. It will of course be understood that the plate G² has electrical connection with the shutter G and that the make and break included in the night-signal, which directly operates the said signal, consists of the arm B², spring *g*², and plate G², which are operated through the electromagnet B and its armature B', the shutter G and the contact-point G' when said shutter is dropped acting as a switch to switch in the night-signal at this particular point, and after the shutter G has once dropped it remains in this position in contact with the point G', thereby giving a continual alarm until the operator restores the same to its normal condition.

H and H' represent two spring-arms electrically connected through electromagnet B with the line-wire C and forming or establishing, by means of the arm H' when in contact with a pin J and when the switch-plug is not inserted, the circuit through the main line and return-line, including the electromagnet B, and the generator at the subscriber's telephone, this being the normal condition of the line and switch when not in use.

K represents a plate secured to block F and electrically connected to wire K'; the wire K' in turn including the local or board generator of the exchange for sending in the signal to the subscriber. This plate K operates in conjunction with the spring-arm H as a make and break between the generator at the exchange and the line leading to and from the subscriber's telephone, and thus when in the position shown in Fig. III of the drawings the circuit will pass from the subscriber's telephone through main line C, through electromagnet B, from electromagnet B to spring H, thence to plate K to board or exchange generator, and from thence to ground or return wire D back to subscriber's telephone, including the signaling device at this point.

L represents a metallic plate secured, preferably, to the lower end of block F. The plate L is electrically connected by means of a wire L' with and includes the local exchange or operator's telephone for communicating with the subscriber. The electrical connection between the main line C from the subscriber's telephone and the operator's telephone is made or accomplished by bringing the spring-arm H' in electrical contact with the plate L, the circuit thus established being from the subscriber's telephone to main line C, through magnet B to spring-arm H', through

plate L, line L', through operator's telephone and back to ground or return wire, thus making a circuit between the operator's and subscriber's telephones.

M represents a metallic bushing, the front end of which projects through the switchboard A. This bushing M extends back through the block F and is so mounted therein as to freely oscillate or turn. To the rear end of the bushing M is secured a collar M', the collar M' being so secured to the bushing M as to move or oscillate with it. The collar M' is in turn provided with a pin J, which is in electrical contact with the spring-arm H' when the switch is in its normal condition, thus forming part of the circuit between the switch and the main line of the subscriber's telephone. The spring E, being normally in contact with the rear end of the bushing, completes the circuit to ground or return wire and thence back to subscriber's telephone. This pin J also acts to operate the arms H and H', according to the direction in which the switch-plug is turned, thus making electrical contact, respectively, as hereinbefore described, with the local or exchange generator and with the local or exchange telephone. At the front end of the bushing M its interior is provided, preferably, with a set of teeth *m*, which coincide or mesh with a set of teeth or spurs provided on the switch-plug. The function of the teeth *m* and the spurs on the switch-plug is to cause the parts to engage so that the switch-plug will engage the bushing M as the switch-plug is manipulated. However, instead of providing the teeth *m* in the bushing M and providing teeth or spurs on the switch-plug for engaging therewith I may form these parts irregular in shape, so that they will coincide one with the other and engage in such a manner that when the plug is inserted and turned the bushing M will also turn with it. It is the turning of the plug in the plug-switch that operates the pin J and through it manipulates the arms H H'.

N N' represent two arms projecting side-wise from the front of the bushing M and so located in relation to the shutter G as to be free of said shutter when said shutter drops and the said arms are horizontal, which is their normal position. When the plug is turned, however, thus turning the bushing M in one direction or the other, it will be seen, as illustrated in Figs. I and II, that either the arm N or the arm N' will engage the said shutter G and throw said shutter up to its normal position and cause it to be engaged by the nose *b'* of the arm B², thus bringing the shutter again to a normal condition ready for signal. The insertion of the plug in the bushing M in no manner operates the shutter. The shutter is operated entirely by the manipulation of the plug to one direction or the other by the operator at the same time of making connection either with the operator or exchange telephone or at the time of sending in the signal to call the subscriber, and it will be

seen that both operations of switching and closing shutter G are performed at one and the same time. This is a matter of great convenience and a great saving of time in making connections, inasmuch as all the operator has to do when called is to insert the switch-plug in the bushing M, give the plug a turn in such direction as to make contact, so as to form a circuit between the operator and the subscriber, get the number or call, insert the other plug in proper place to form connection with the desired telephone, turn the plug so as to switch in the exchange-generator to call the wanted telephone or subscriber, allowing the parts to resume their normal position with plugs in, the subscribers when through talking turning in proper signal and the shutter again dropping. The plugs are then taken out and the parties disconnected. The mere turning of the plug during the several manipulations serves to close the shutter G ready for the next call.

I have shown in Fig. V of the drawings a construction of plug R which I prefer to use. It is constructed of an outer metallic casing O, having a bushing or sleeve of insulating material O', and an interior metallic pin P, which is insulated from the metallic casing O by insulation O'. The two metallic parts O and the pin P are both suitably electrically connected with the wires of the connecting-cord, as is usual, and the circuit between the subscribers is through these parts of the plug and the cord, as usual.

r r indicate the teeth or spurs hereinbefore mentioned for engaging the teeth or spurs *m* in the bushing M.

It will of course be clearly understood that when the plug R is inserted, as shown in Figs. II, III, and IV, the insertion of the plug causes the projecting pin P of the switch-plug to engage with the beveled lip *e'* of the spring-bar E, thus forcing said spring-bar E out of contact with the bushing M at its rear end and forming an electrical contact between said spring and the pin P and establishing a return-circuit between subscribers' lines. The bushing M is cut away at its rear end, as illustrated in Fig. IV at M², to allow of the disconnection by means of the pin P between the spring-bar E and bushing M, and also to allow of the said bushing being turned in the one direction or the other after the plug has been inserted without making electrical contact between the spring-bar E and the bushing M.

While I have shown and described a construction of plug-switch especially adapted to perform the functions contemplated, I do not wish to be understood as limiting my invention to the details of construction herein shown and described, inasmuch as it is apparent to any one skilled in the art that these details may be modified and still the same result be obtained.

What I claim is—

1. In a plug-switch the combination with a

signal-shutter, of a plug-switch provided with projecting arms, and means for rotating said plug-switch to cause its arms to engage the shutter and close it.

2. In a switch apparatus of the class described, the combination with a signal-shutter and suitable main and local circuits, of suitable make and break contacts for completing the circuits or breaking the circuits, and a plug-switch so constructed that the turning of the same to one direction or the other will make or break the contacts and thus open or close the circuit as desired and also provided with projecting arms adapted to engage and close the shutter.

3. In a telephone-switch, the combination with a signal-shutter, and electromagnetic means for releasing it, of a plug-switch to effect the required electrical connections, and a plug adapted for insertion into said plug-switch, said plug-switch being provided with laterally-projecting arms adapted to engage the shutter.

4. In a switch of the character described, the combination with a switch-plug, a signal-shutter and suitable main and local circuits, of a bushing, provided with arms or lugs so located as to engage the shutter when said bushing is rotated, and also provided, at its rear end, with means, substantially such as described, for making and breaking the main and local circuits connected to said switch, substantially as and for the purpose shown and described.

5. In a switch of the character described, the combination with the switch-plug provided with two metallic or electrically-conducting sections insulated from each other, of a bushing for receiving said plug and adapted to be operated in a rotary direction by the same, said bushing provided with means for making and breaking local and main circuits connected to said switch, substantially as described, whereby the insertion of the plug in the bushing of the switch will first operate to cut out the ground or return wire from the bushing and then by rotating said plug in either direction make or break the local or main circuits, substantially as and for the purpose shown and described.

6. The combination with a central-office telephone and call, and subscribers' telephones, of a switch comprising a plug, a bushing adapted to be operated by said plug, and provided at its rear end with a projection, and two spring contact-points so located that the rotation of the bushing will cause said points to open and close their respective circuits.

7. The combination with a central-office telephone and call, and subscribers' telephones, of a telephone-switch of the character described, comprising a signal-shutter, a bushing provided with arms for engaging said shutter when down or open, a plug adapted to engage, and operate said bushing in a rotary direction, the rotating or oscillating of said bushing by means of the plug acting

through means of the arms to cause the shutter to resume its normal condition, the several circuits controlled by said switch, a pin or projection, spring-arms operated by said
5 projection, substantially such as described whereby the make and break of the several circuits controlled by the switch is accomplished.

In testimony whereof I sign this specification, in the presence of two witnesses, this 13th day of December, 1897.

SAMUEL B. RAWSON.

Witnesses:

ELLA E. TILDEN,
J. L. WARD HOOVER.