

No. 640,823.

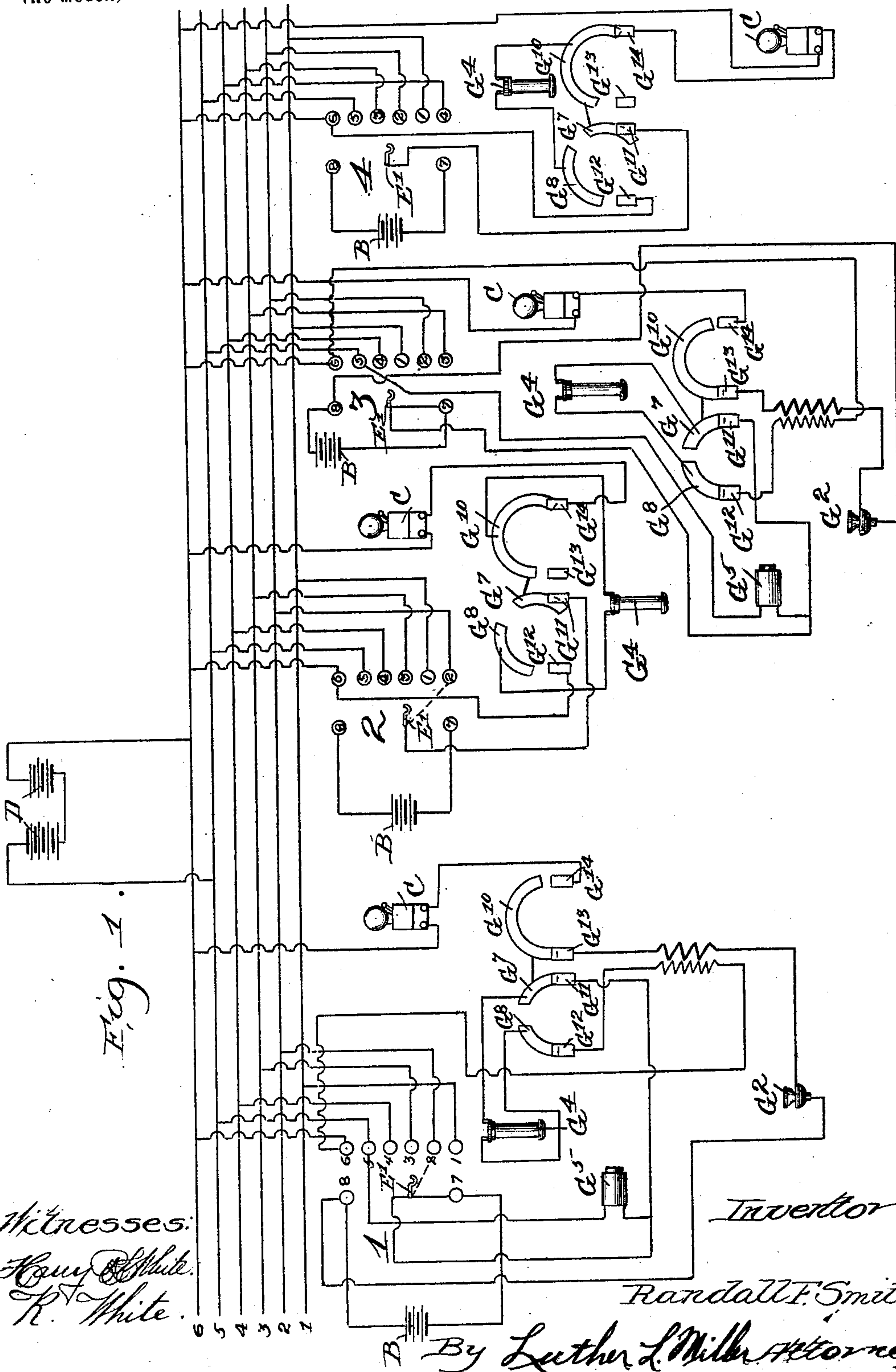
Patented Jan. 9, 1900.

R. F. SMITH.
TELEPHONE.

(Application filed Feb. 16, 1899.)

3 Sheets—Sheet 1.

(No Model.)



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3 Sheets—Sheet 2.

(No Model.)

Fig. 2.

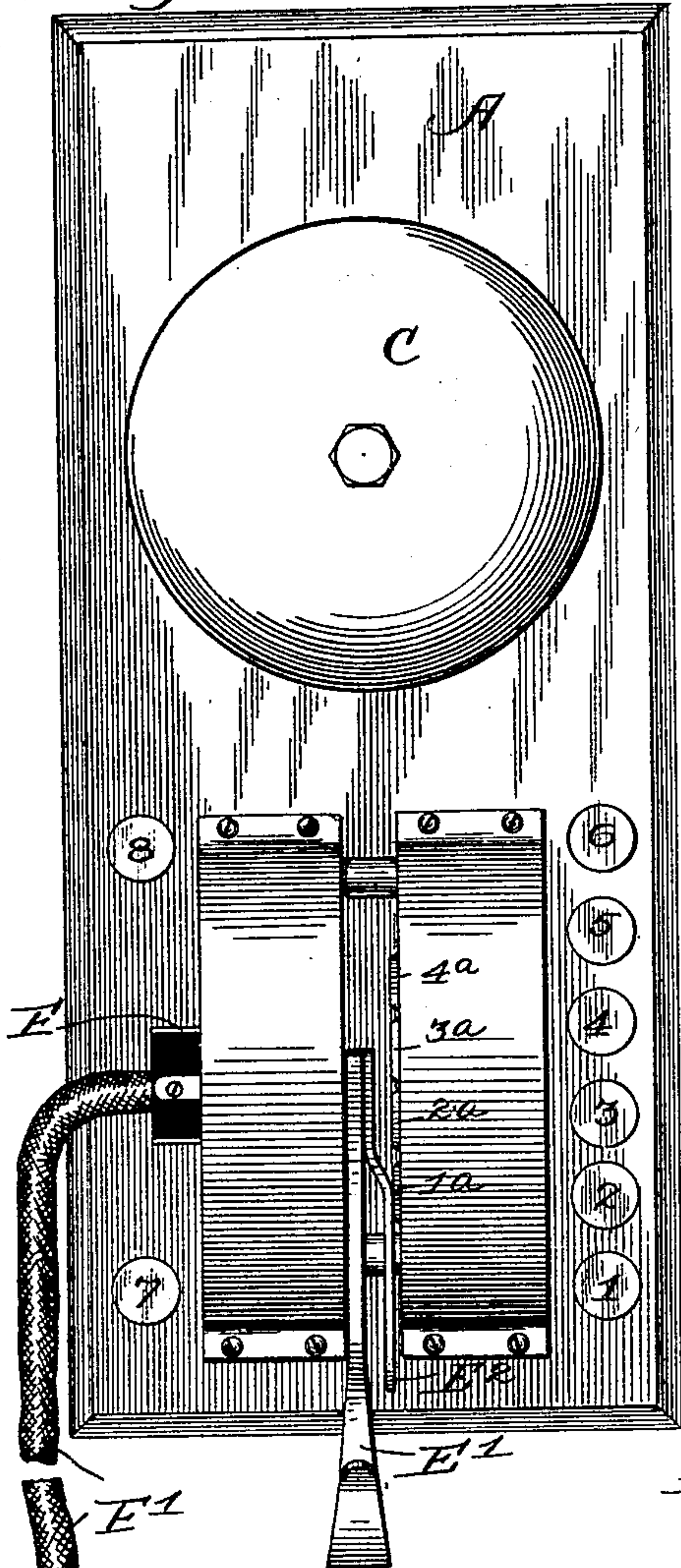


Fig. 3.

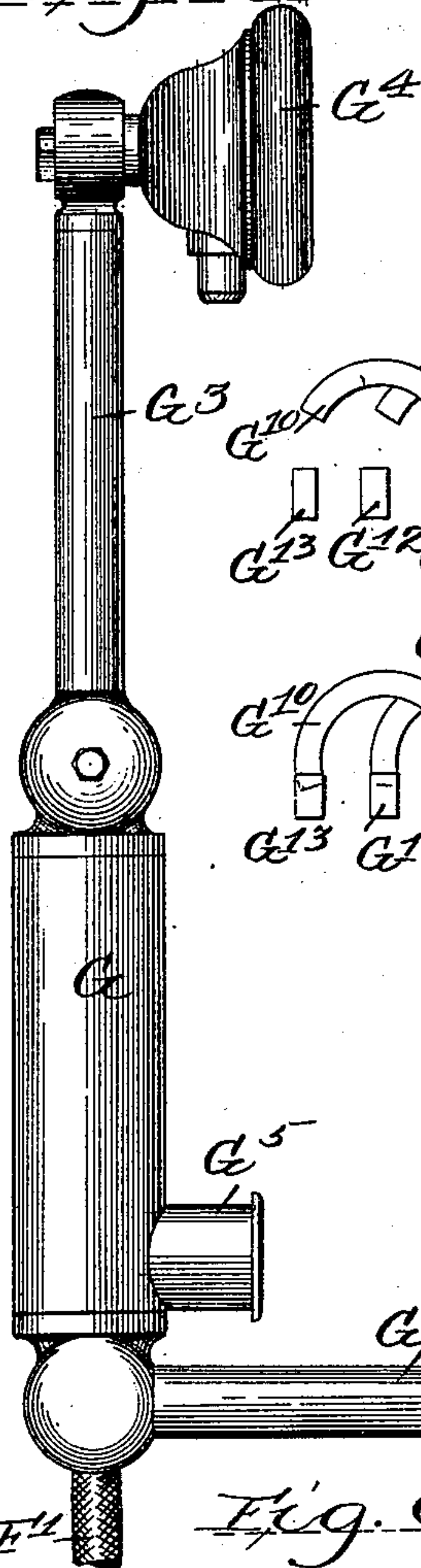


Fig. 4.

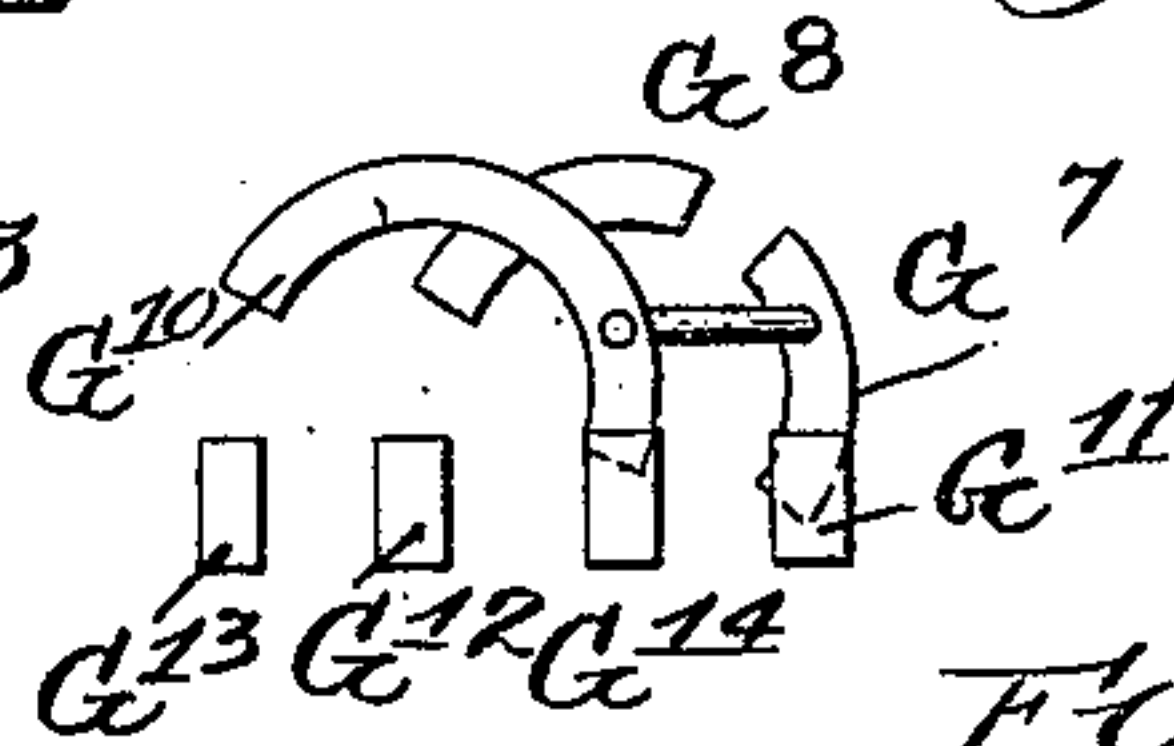


Fig. 5.

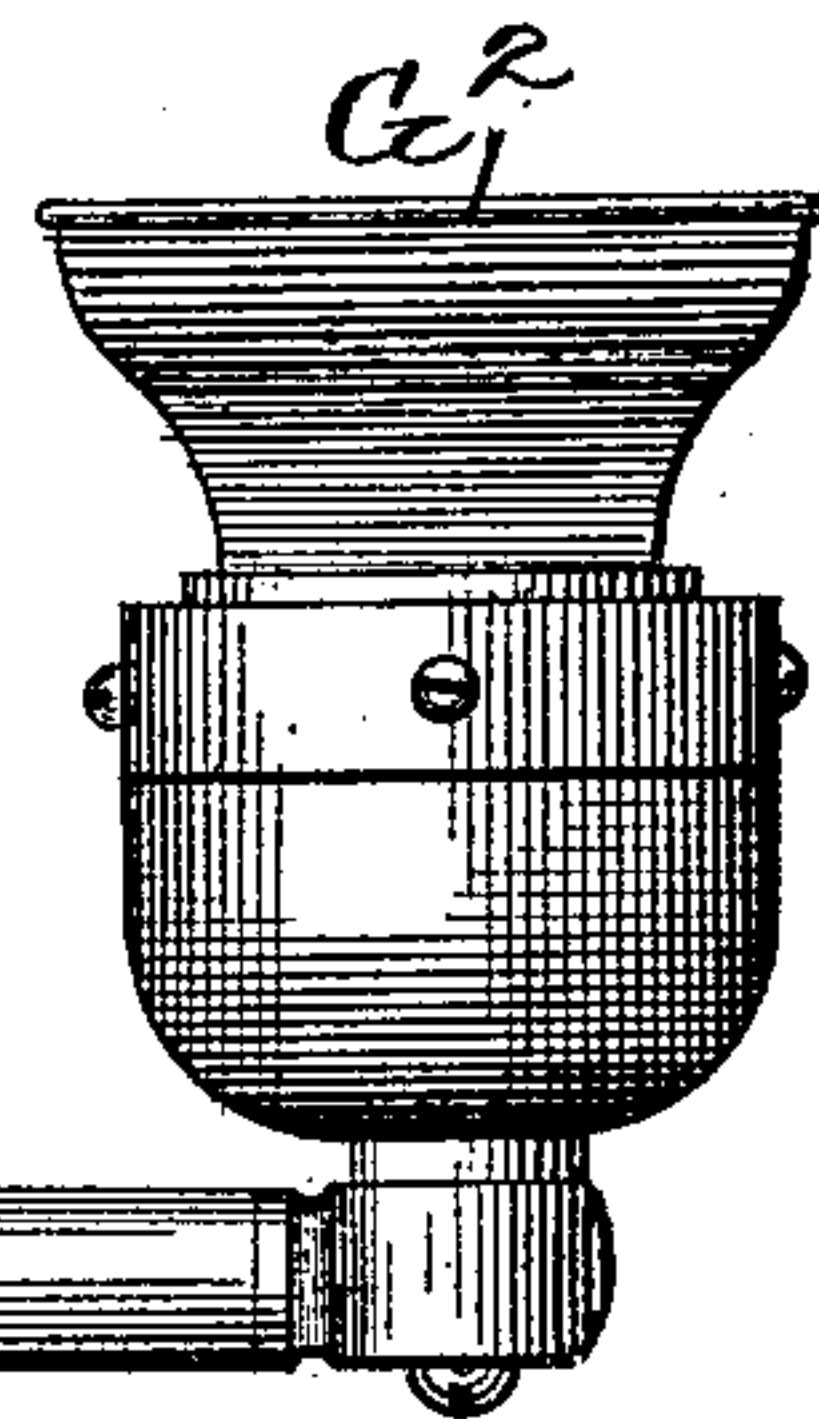
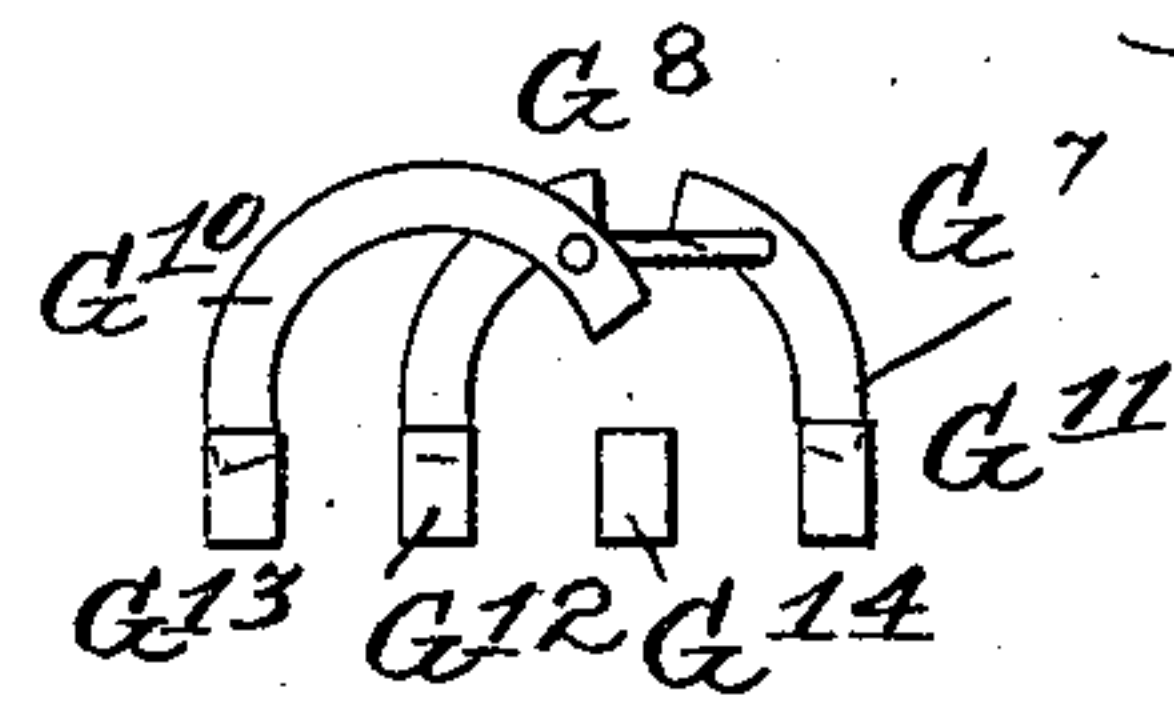
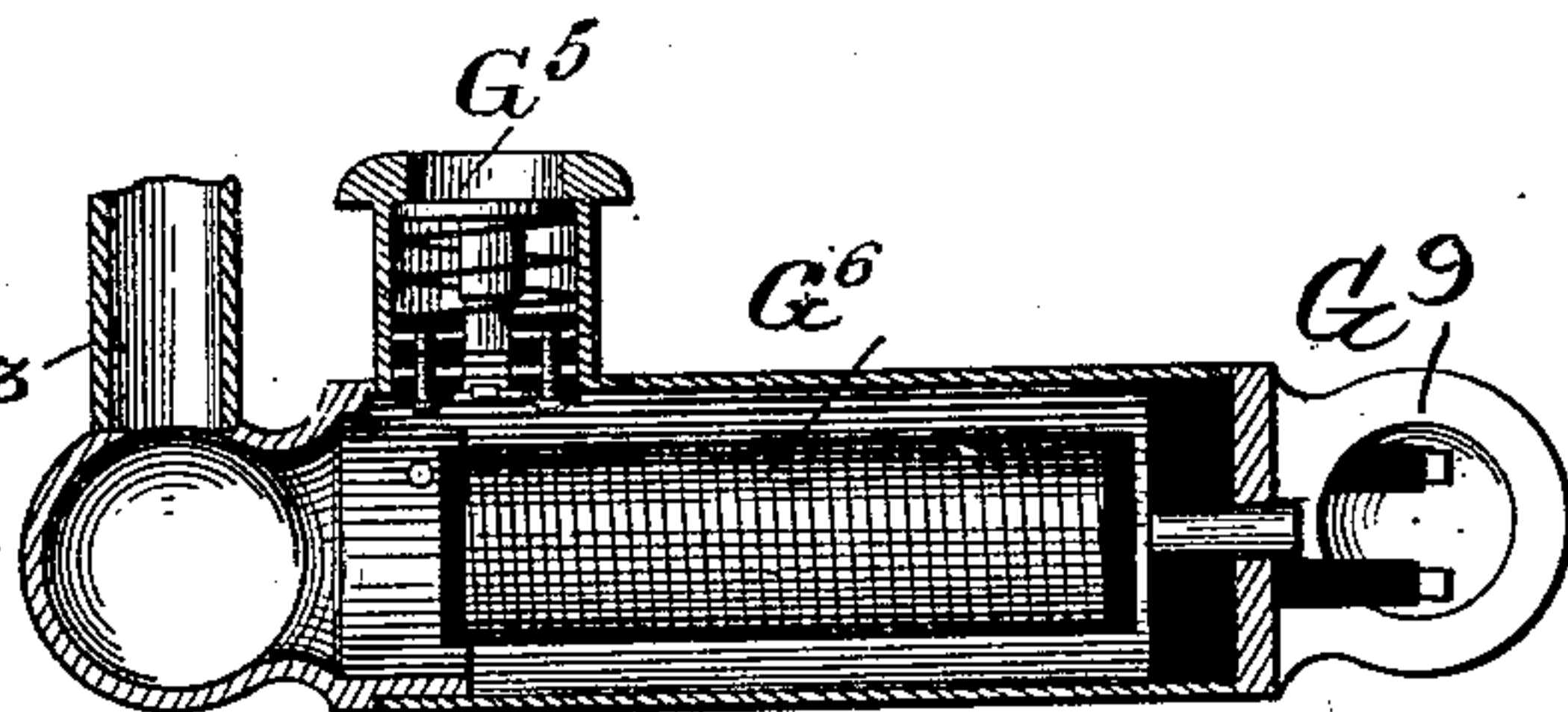


Fig. 6.



Witnesses:
R. White.

Harry B. White.

By

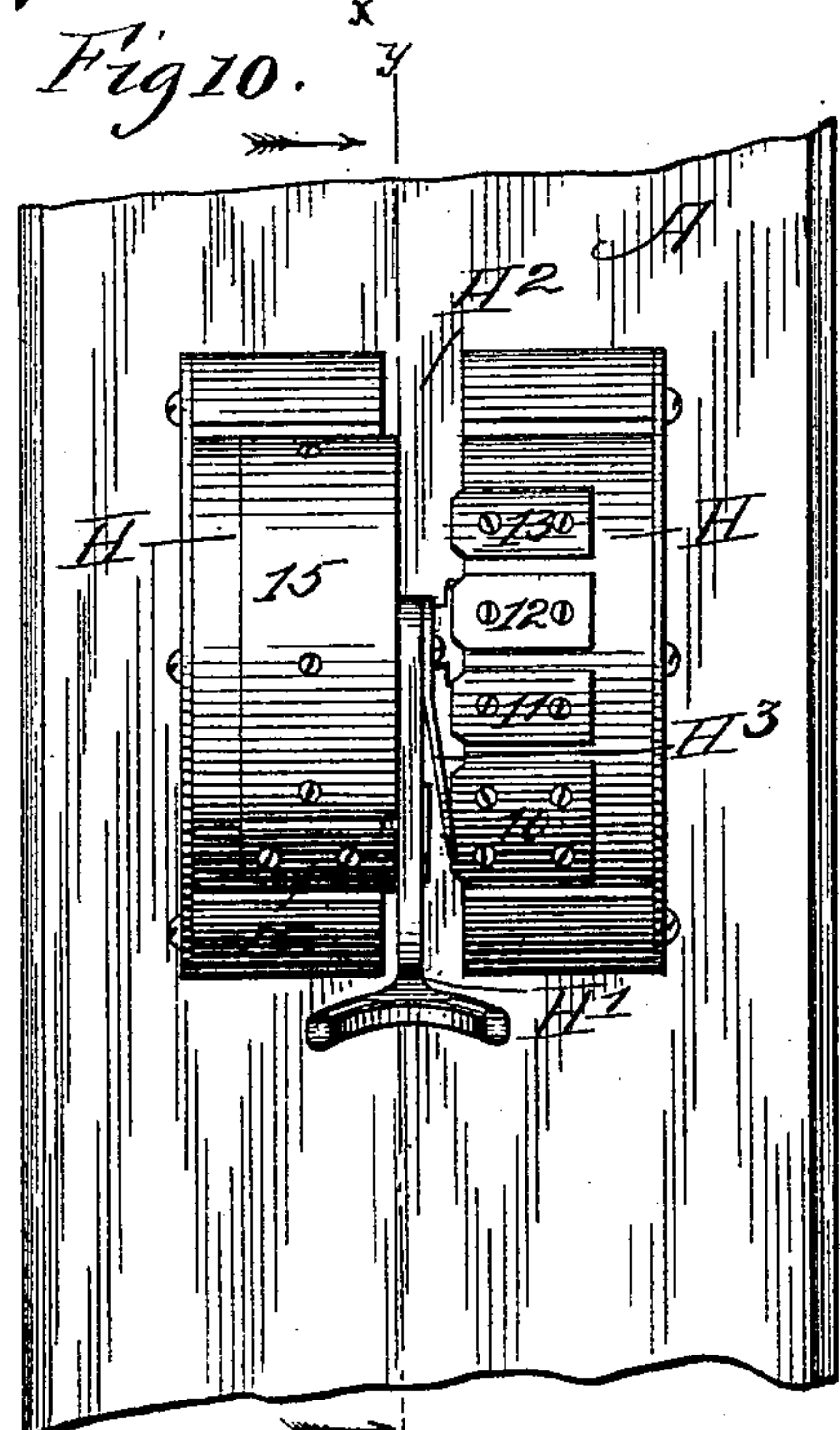
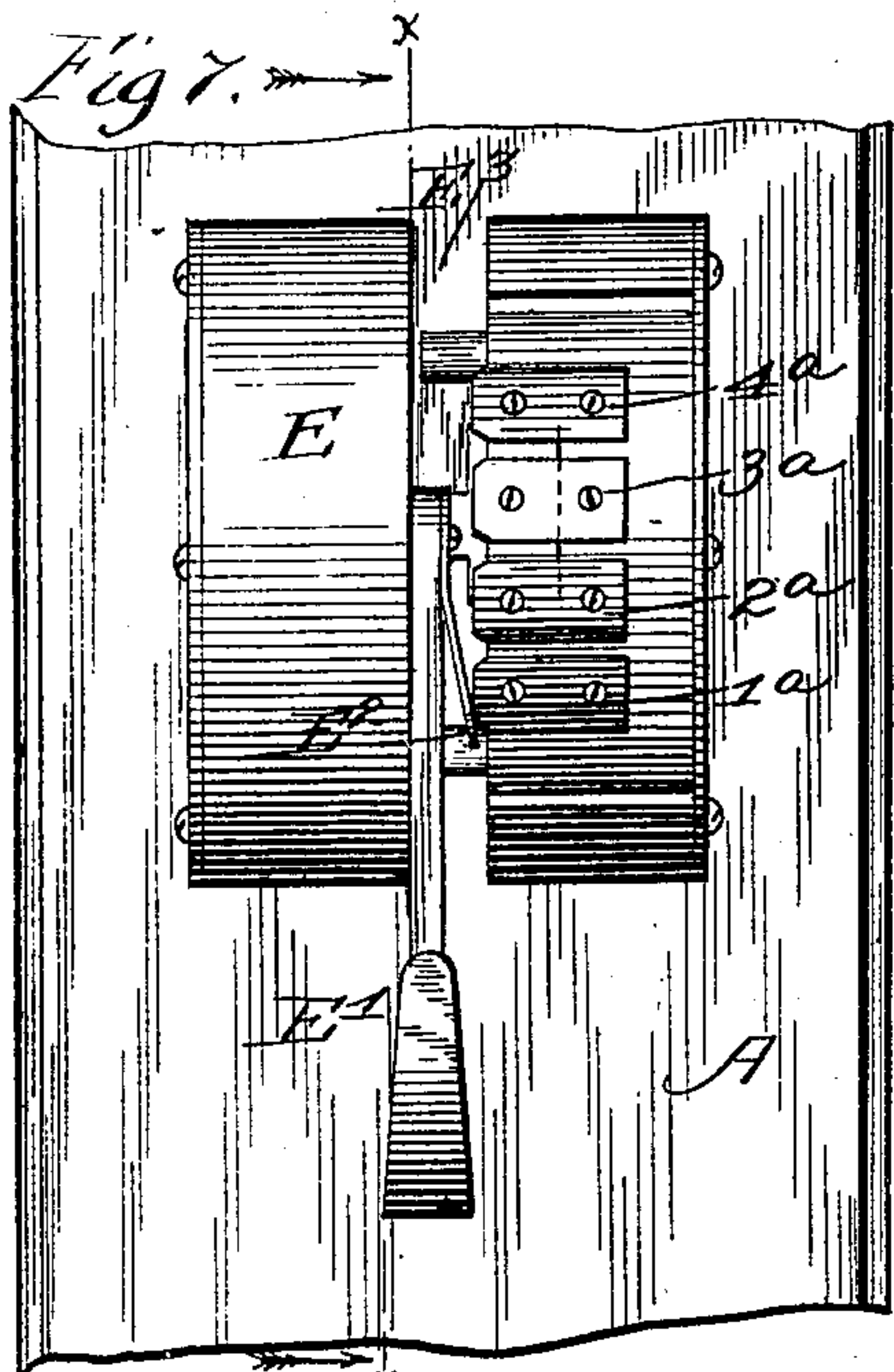
Inventor:
Randall F. Smith,
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R. F. SMITH.
TELEPHONE.

(Application filed Feb. 16, 1899.)

3 Sheets—Sheet 3.

(No Model.)



Witnesses.
R. White.
Harry B. White.

Fig 8.

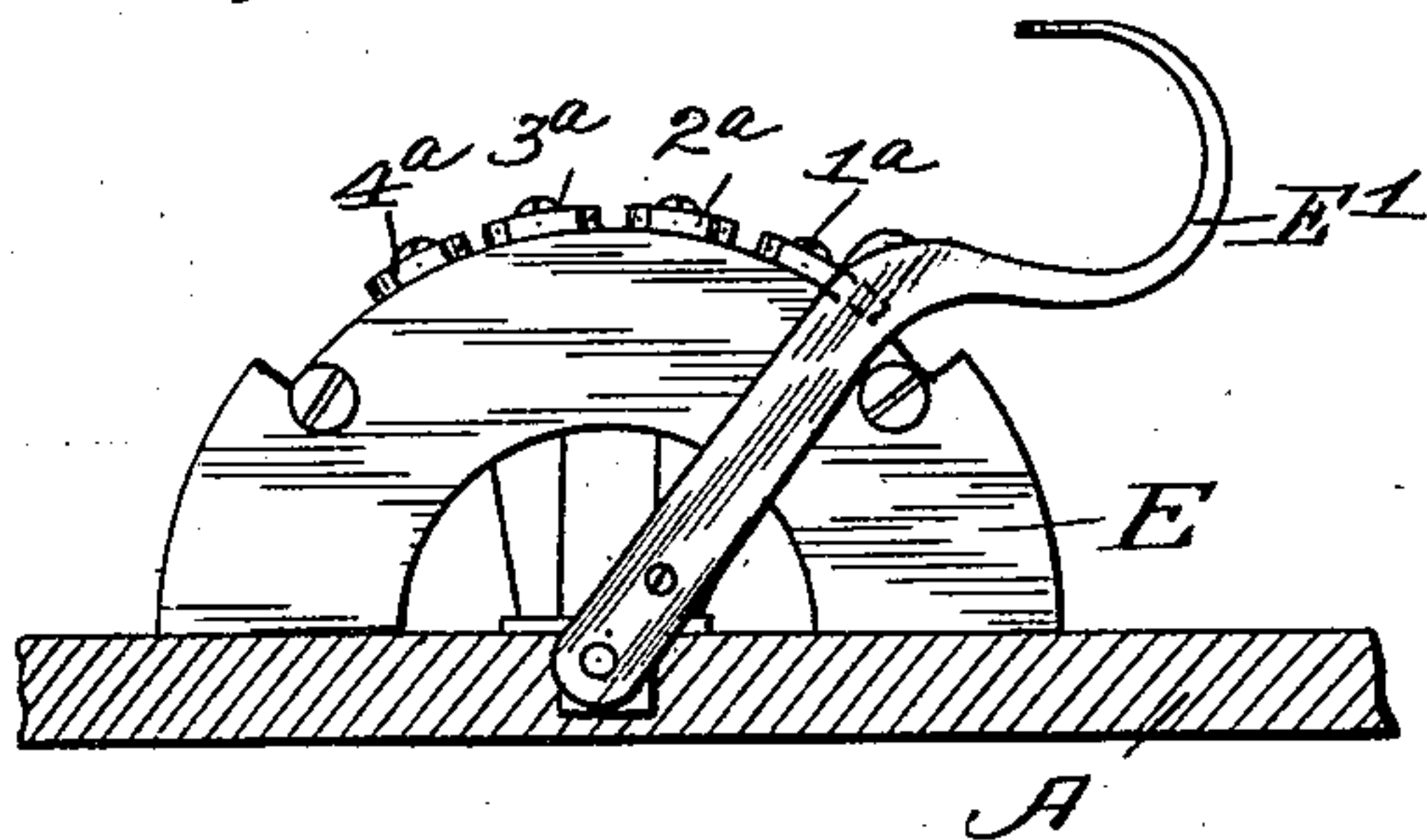


Fig 9.

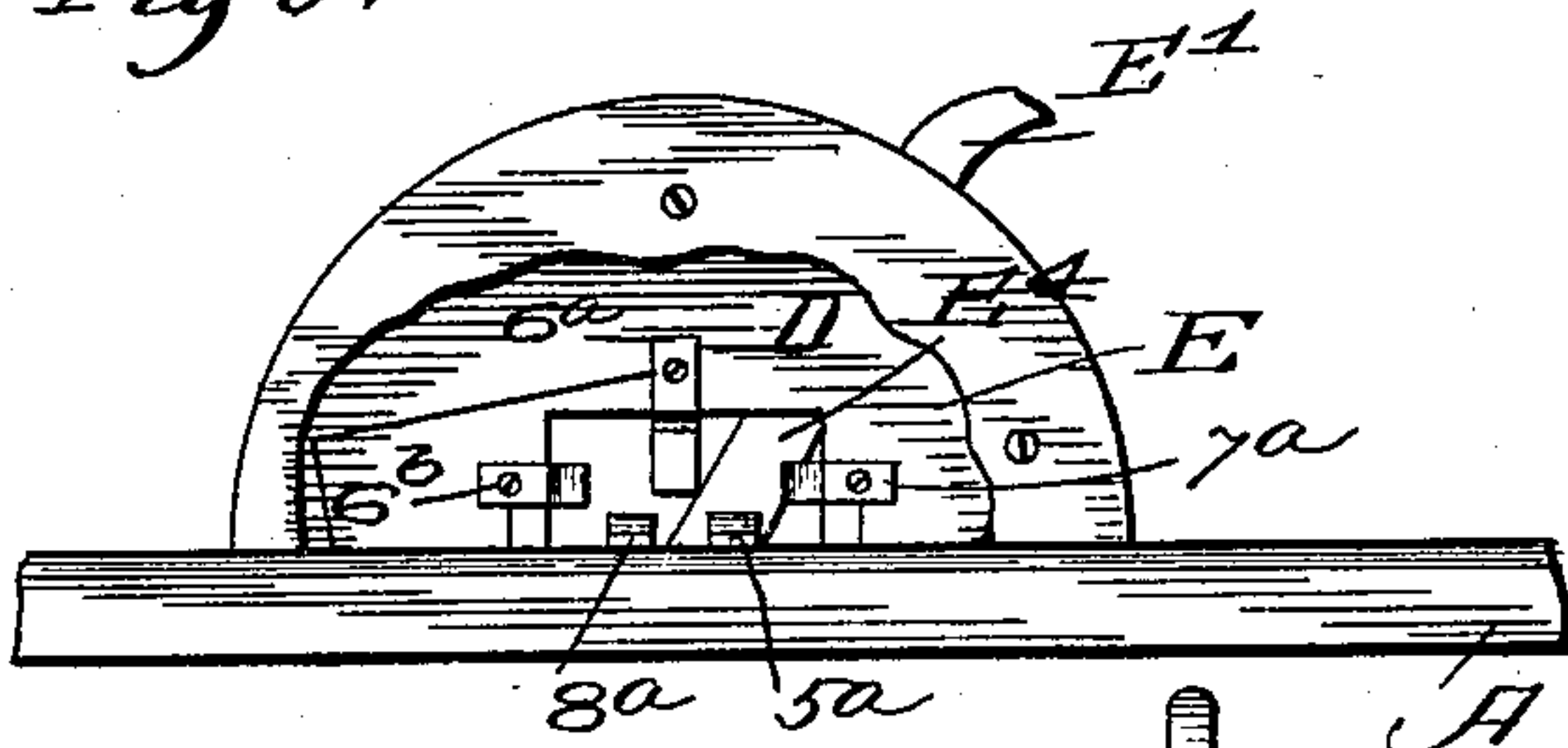


Fig 11

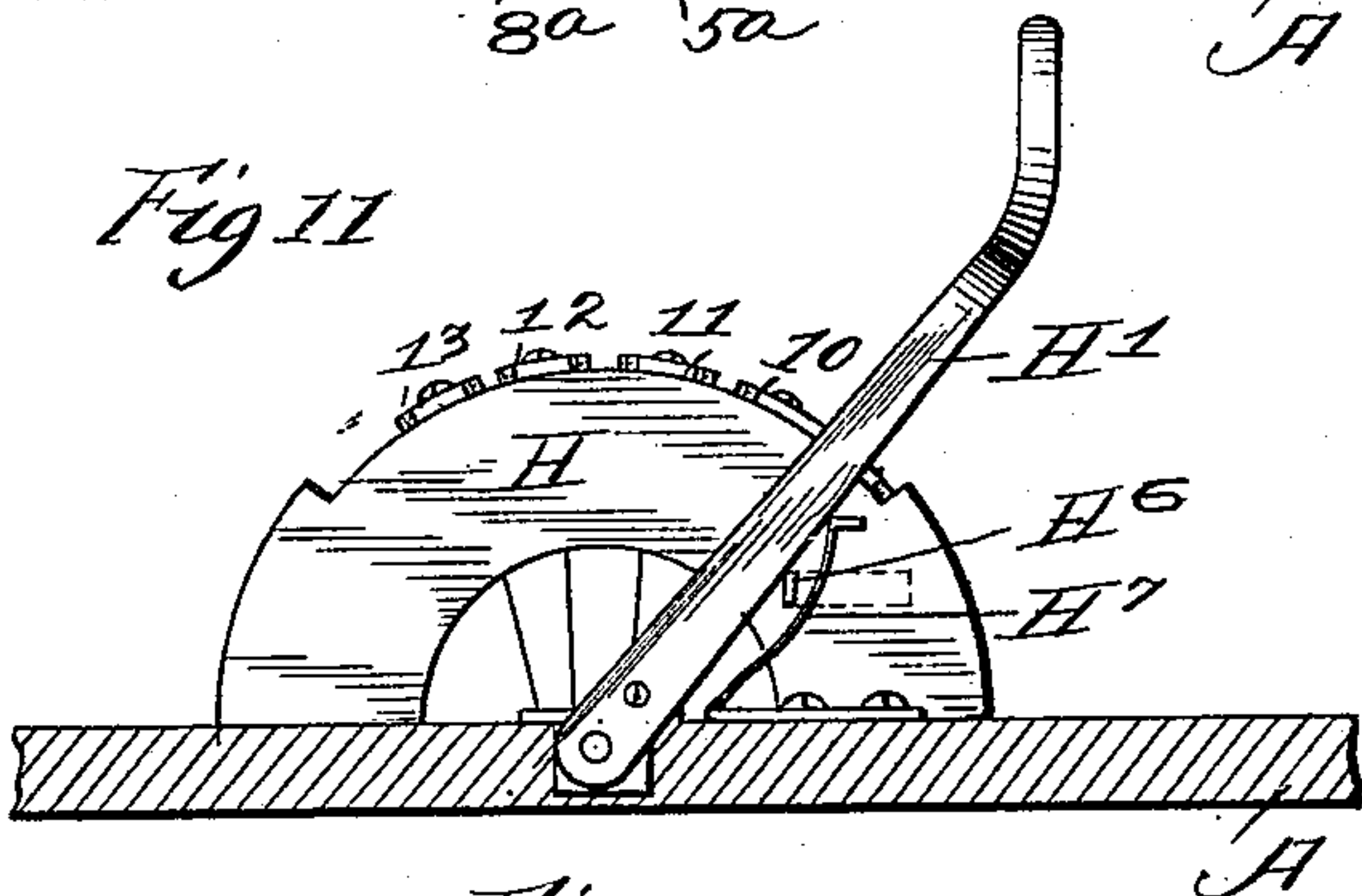
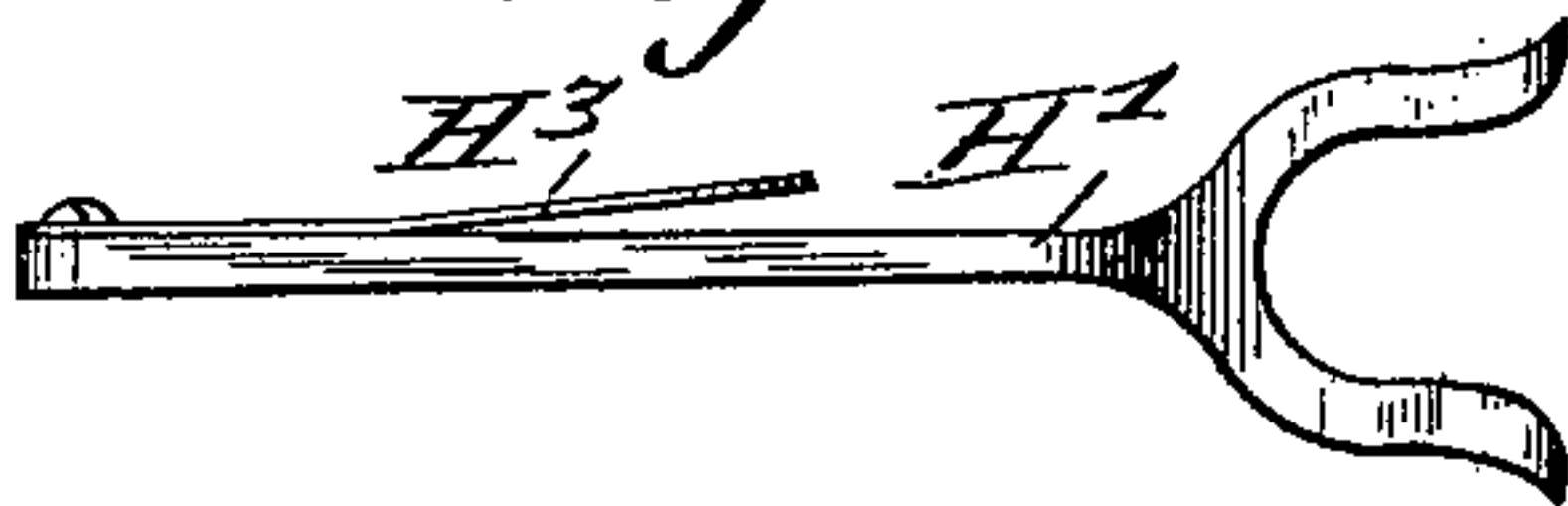


Fig 12.



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by

UNITED STATES PATENT OFFICE.

RANDALL F. SMITH, OF CHICAGO, ILLINOIS.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 640,823, dated January 9, 1900.

Application filed February 16, 1899. Serial No. 705,627. (No model.)

To all whom it may concern:

Be it known that I, RANDALL F. SMITH, 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 Telephones, of which the following is a specification.

The object of this invention is the production of a simple compact telephone to be used in connection with an intercommunicating system—as, for instance, in a factory where telephonic communication between several different departments is desirable, among residences or business-houses, and on ship-board in communicating between different parts of the vessel.

In the accompanying drawings, Figure 1 is a diagrammatic sketch of the telephone system, indicating the connections necessary to permit station No. 1 to communicate through its telephone instrument with station No. 3, indicating also (by the assistance of dotted connecting-lines at the switchboards) the course of the electric current when the telephoner at station No. 1 rings the call-bell at station No. 2. Fig. 2 is a view of the switchboard, showing the transmitter and receiver folded. Fig. 3 represents the said transmitter and receiver unfolded, open for use. Fig. 4 is a view in the nature of a diagram, showing the relative positions of the contact-points of the switch within the hinge-joint between the transmitter and the receiver when the instrument is folded. Fig. 5 is a view similar to the preceding figure, showing said contact-points in the relative positions occupied by them when the said instrument is open for use. Fig. 6 is a central section through the handle of the telephone instrument. Fig. 7 is a face view of the switch mechanism on the switchboard, the covering of said mechanism being removed. Fig. 8 is a section through said switch mechanism on dotted line *xx*, Fig. 7. Fig. 9 is a side elevation of the switch, a portion of the outer casing being removed. Figs. 10, 11, and 12 represent a modified form of switch mechanism, Fig. 10 showing a face view thereof with the casing removed, Fig. 11 a section through the switch-block on dotted line *yy*, Fig. 10, and Fig. 12 an edge view of the switch-hook.

Like letters and numerals of reference indicate corresponding parts throughout the several views.

In the embodiment here shown of my invention I employ metallic circuits throughout, and therefore must provide a cable having as many insulated wires, plus two, as the system has stations. This cable runs from one station to another throughout the system. At each station is provided a switchboard having on one edge of its face a binding-post for the reception of each of said cable-wires, and on its opposite face a binding-post for each of the two wires from the posts of a local battery called the "talking-battery." At the top of the board is provided a call-bell and below the bell a switch for electrically connecting the telephone instruments connected with the switchboard with the line of any station in the system. This switch has a hook for suspending the transmitter and receiver, which transmitter and receiver in this instrument are joined and have in the frame supporting them a hinge permitting them to be folded together when not in use. This hinge also contains a switch for breaking the battery-circuits through the instrument when the hinge is closed and completing the circuits when the instrument is opened.

A is the switchboard, identical in mechanical construction in all stations, and as the system to be here described comprises four intercommunicating stations the switchboard illustrated is provided, near the right-hand side of its face, with six binding-posts, which at station No. 1 (for convenience to be hereinafter called the "home" station) have been designated by the numbers 1, 2, 3, 4, 5, and 6, which numerals also severally indicate the connecting-wires attached thereto. In other stations, therefore, the numerical arrangement of the binding-posts 1, 2, 3, and 4 is not the same as in station No. 1, for the reason that the lower post always represents the home wire of any station.

A talking-battery B, local to every station, is electrically connected with the binding-posts 7 and 8 near the left-hand edge of the board A.

Near the upper part of the switchboard A a call-bell C is mounted, the wire 6 (herein-

after to be called the "line-wire") being in circuit with the winding of the magnets of said bell C. This circuit is completed by the wire 5, which is connected with one pole of the ringing-battery D, and is therefore called the "ringing-battery" wire. The other pole of the ringing-battery D is connected with the line-wire 6. One ringing-battery answers for the entire system and is located at any convenient point.

On the face of the board A a little distance below the bell C is provided the switch mechanism whereby the telephone at the home station may be electrically connected with the telephone of any other station of the system.

E is the base-block, of semicylindrical form, for the switch mechanism, and in the lower part thereof is pivoted the switch-hook E', having electrical connection through the binding-post 7 with the talking-battery B and carrying on its side the contact-spring E². The block E is provided with a central opening E³ for the reception of the switch-hook E', which opening is elongated to permit said hook to be moved upon its pivot. On the curving face of the base-block E and on one side of the opening E³ are affixed the insulated contact-points 1^a, 2^a, 3^a, and 4^a in electrical contact with the wires and binding-posts 1, 2, 3, and 4, respectively, the first representing the home station, and the wires 2, 3, and 4 running to the home contact-point (the lower one of the series) of each station—to wit, to stations Nos. 2, 3, and 4, respectively. This arrangement whereby the home contact-point of every station is the lower one of the series of contact-plates is adopted in order that the act of hanging the instrument upon the switch-hook E' automatically brings said hook into contact with the home contact-plate, guarding against the circuit being left open by the thoughtlessness of a telephoner. In the opposite side of the base-block E is an opening E⁴, having the several contact-springs—to wit, 6^a—at the upper side of the said opening, which is the main-line wire 6, after passing through the coils of the call-bell magnets; 7^a, one of the lines of the talking-battery B from binding-post 7; 5^a, the ringing-battery wire 5 from binding-post 5; 8^a, the opposite line of the talking-battery B from binding-post 8, and 6^b the line-wire 6, direct from binding-post 6. A plug F at the end of a five-wire cord F' has corresponding contact-points, and the wires of said cord are in proper electrical connection both with said contact-springs and the proper lines in the telephone instrument to be next described. The plug F is removable from its engagement with the opening E⁴, whereby the telephone instrument may be removed from its connections with the switchboard.

The telephone instrument when folded is substantially of rectangular outline, and comprises the hollow handle G, having the tubular arm G' extending at right angles thereto and bearing at its outer end the transmitter G². At

the opposite end of the handle G is pivoted the hollow arm G³, having the receiver G⁴ at its outer end and in such a position that the face of said receiver G⁴ folds against the face of the transmitter G². The handle G, together with the tubular arms G' and G³, comprise the supporting-frame of the telephone instrument. The cord F' enters the handle G at the end bearing the transmitter-arm G', the ringing-battery wire therefrom leading directly to one point of the push-button G⁵, fixed on said handle G, the other side of said push-button connecting, through the hinge between the handle G and the pivoted arm G³, with the switch-hook E'. An induction-coil G⁶ is located within the handle G, and wires from the primary coil thereof extend outward through the arm G' to their proper and usual connections with the transmitter, while the lines of the secondary coil of said induction-coil G⁶ form the usual magnet-windings within the receiver. At the hinge-joint, between the handle G and the receiver-arm G³, the receiver-wires terminate in the two curving contact-points G⁷ and G⁸, embedded within the flattened end of the said arm G³, which lies within the bifurcation G⁹ of the end of the said handle G. On the opposite side of said flattened portion of said arm G³ the semicircular contact-plate G¹⁰ is affixed, the said contact-plates G⁸ and G¹⁰ being in electrical connection by means of a rivet passing through said arm G³. Four contact-points G¹¹, G¹², G¹³, and G¹⁴, suitably insulated, lie within a hollowed portion of the handle G opposite said contact-plates G⁷, G⁸, and G¹⁰, two of said points lying on each side of said arm G³. The contact-point G¹¹ is electrically connected with one of the lines of the talking-battery B and with the switch-hook E' and is in touch with its contact-plate G⁷ at all times. The contact-point G¹² is a terminal of the line-wire 6, extending through the secondary winding of the induction-coil G⁶, and is in touch with its contact-plate G⁸ only when the instrument is open for talking. The contact-point G¹³ carries the other line of the talking-battery B and is also electrically connected with the switch-hook E' through the transmitter G² and the primary winding of the induction-coil G⁶. It is in contact with the plate G¹⁰ only when the instrument is open for talking. The contact G¹⁴ is the terminal of the main line 6 through the coils of the call-bell C and is in touch with its contact-plate G¹⁰ only when the instrument is closed.

By reference to the diagrammatic view Fig. 1 it will thus be seen that when the instrument is open for talking it is connected with main-line wire 6 on one side and through the hook E' with the wire of any other station. If the push-button G⁵ is pressed when the instrument is open, with the switch-hook E' at the desired point, only the call-bell of the called station will be rung; but if operated when the telephone is closed both the call-bell of the home station and of the called

station will be sounded. It will also be seen that when the telephone is closed the battery-circuits are open.

The dotted line from the switch-hook E', station No. 1, Fig. 1, to binding-post No. 2 indicates the required position of said hook in that station in order to ring the call-bell at station No. 3, Fig. 1, when the push-button G⁵ is operated.

The operation of this telephone is as follows: When a telephoner at any station desires to communicate with a person at any other station, he takes the telephone instrument from the switch-hook E', places the said switch-hook opposite and in contact with the plate which is the terminal of the line leading from the desired station, presses the push-button G⁵, opens the telephone, and the circuit between the two said stations is complete, including therein the two telephone instruments and the talking-battery B of the home station. When a "call" is made, the person at the station called opens the telephone and proceeds to talk, all connections having been made by the telephoner at the calling station.

The main line 6 is always one line of a circuit between intercommunicating stations, the circuit being completed through the switch-hook E' and the wire extending from the contact-plate on the switchboard of the telephoner's home station to the home contact-plate (the lower plate) on the switchboard at the station called. The ringing-circuit is made up of the main line 6 and the ringing-battery line 5, one pole of the ringing-battery D being connected with each of said lines 5 and 6.

The course of the current incident to the connections shown in Fig. 1, enabling station No. 1 to communicate with station No. 3 and wherein the switch-hook E' is assumed to be at the contact-point 3^a and switch-hooks at other stations are at their respective home-contact-points, may be traced as follows, starting at the talking-battery B, station No. 1: talking-battery binding-post No. 8, transmitter G², primary winding of induction-coil G⁶, contact-point G¹³, contact G¹⁰, connecting-rivet, contact G⁷, receiver G⁴, contact G⁸, contact-point G¹², secondary winding of induction-coil, binding-post 6, line-wire 6 to station No. 3, binding-post 6, secondary winding of induction-coil, contact-point G¹², contact G⁸, receiver G⁴, contact G⁷, contact-point G¹¹, connecting-rivet, contact G¹⁰, contact G¹³, primary winding of induction-coil, transmitter G², binding-post G⁸, talking-battery at station No. 3, binding-post No. 7, hook E', station No. 3, and contact-point 3^a.

The course of the current shown in Fig. 1 permitting the telephoner at station No. 1 to ring the call-bell at station No. 2 is as follows: ringing-battery D, line-wire 5, binding-post 5, station No. 1, push-button G⁵, switch-hook E' of station No. 1, binding-post 2, line-wire 2, binding-post 2 of station No. 2, switch-hook E', station No. 2, contact-point G¹¹, contact

G⁷, connecting-rivet, contact G¹⁰, contact-point G¹⁴, bell C, station No. 2, line-wire 6, ringing-battery D, line-wire 5 to binding-post 5.

The local transmitter-circuit may be traced as follows in station No. 1, it being the same in all other stations: transmitter, primary winding of induction-coil, contact-point G¹³, contact G¹⁰, connecting-rivet, contact G⁷, contact-point G¹¹, line to switch-hook, switch-hook E', binding-post 7, talking-battery B, binding-post 8, line to transmitter.

The modified form of switch shown in Figs. 10, 11, and 12 contemplates the making of all connections now made by the operation of the hinge in the telephone instrument by the switch-hook. Here, as in the other switch mechanism, a semicylindrical base-block H has contact-points 10, 11, 12, and 13 on one side of its face representing all stations on the line, number 10 representing the home station, and each being the terminal of a wire in the cable running from the home-plate of each of the several stations in the system. The pivoted switch-hook H', forked at its outer end, is free to be moved within the opening H² into such position that its contact-spring H³ lies in engagement with any one of the several contact-plates 10, 11, 12, and 13, the hook itself being in contact with the common return or main-line plate 15, except when said hook is at its position of rest, when it is in contact with the bell-wire plate 16 and its contact-spring H³ in touch with the contact-plate 10 of the home station. A stud H⁶ is the terminal of one of the lines of the talking-battery at the home station and a curving spring H⁷, secured to the base of the block H, normally lies in contact therewith, the purpose of said spring being to raise the switch-hook H' from the bell-wire contact 16 and into contact with the main-line plate 15 when the telephone instrument is removed from said switch-hook. The raising of the hook as just indicated removes it from engagement with the stud H⁶; but electrical connection with said hook is still had through the medium of the spring H⁷, which touches the said stud H⁶ when the hook is raised by said spring. Connection is thus made with the talking-battery of the station called, the battery of the calling station not being included in the circuit.

I claim as my invention—

1. In a telephone, in combination, a handle, an arm extending from said handle substantially at right angles thereto, an arm having a pivotal connection with the opposite end of said handle, a receiver and a transmitter each mounted on one of said arms and adapted to fold together face to face, and battery and line connections for said receiver and said transmitter.

2. In a telephone, in combination, a tubular handle, a tubular arm extending from said handle substantially at right angles thereto, a tubular arm having a pivotal connection with the opposite end of said handle, a receiver and a transmitter each mounted on one of

said tubular arms and being adapted to fold together face to face when not in use, and battery and line connections for said receiver and said transmitter.

5 3. In a telephone, in combination, a tubular handle, a tubular arm extending substantially at right angles to said handle, a transmitter mounted on the outer end of said arm, the axial line of which transmitter is parallel
10 with the axial line of said handle, a tubular arm having a pivotal connection with the opposite end of said handle, a receiver mounted on the outer end of said last-mentioned tubular arm, and being adapted to fold against said
15 transmitter, and battery and line connections for said transmitter and said receiver.

4. In a telephone, in combination, a handle, a transmitter and a receiver, one of which has a pivotal connection with said handle, battery
20 and line connections for said transmitter and said receiver, and a switch adapted to be actuated by the movement at said pivotal connection for changing the electrical connections within said instrument when it is opened
25 or closed.

5. In a telephone, in combination, a handle, an induction-coil in said handle, a transmitter and a receiver, the latter having a pivotal connection with said handle, battery and line
30 connections for said transmitter and said receiver, and a switch for said pivotal connection for changing the electrical connections within said instrument when the instrument is opened or closed.

35 6. In a telephone, in combination, a handle, an induction-coil in said handle, an arm extending substantially at right angles from said handle, a transmitter mounted on said arm, an arm pivoted to the opposite end of
40 said handle, a receiver mounted on said last-mentioned arm, battery and line connections for said transmitter and said receiver, and a switch for said pivotal connection for changing the electrical connections within said instrument when the instrument is opened or
45 closed.

7. In a telephone, in combination, a tubular handle, an induction-coil within said handle, a tubular arm extending substantially at right
50 angles to said handle, a transmitter mounted on the outer end of said arm, a tubular arm pivoted to the opposite end of said handle, a receiver mounted on said last-mentioned arm at its outer end, which transmitter and re-
55 ceiver are adapted to fold together face to face, battery and line connections for said transmitter and said receiver, and a switch for said pivotal connection for changing the electrical connections within said instrument
60 when the instrument is opened or closed.

8. In a telephone, in combination, a tubular handle, a push-button therefor, a tubular arm extending substantially at right angles to said
65 handle, a transmitter mounted on the outer end of said arm, the axial line of which transmitter is parallel with the axial line of said handle, a tubular arm having a pivotal con-

nection with the opposite end of said handle; a receiver mounted on the outer end of said last-mentioned tubular arm and being adapted
75 to fold against said transmitter, battery and line connections for said push-button, said transmitter and said receiver, and a switch for said pivotal connection for changing the electrical connections within said instrument when the instrument is opened or
75 closed.

9. In a telephone, in combination, a tubular handle, an induction-coil therein, which handle has at one end a tubular arm extending
80 substantially at right angles therefrom, and at its opposite end bifurcations for receiving a second tubular arm having a pivotal connection with said handle, a push-button mounted on said handle, a transmitter mounted
85 on the outer end of the first-mentioned arm, a receiver secured to the outer end of the pivotal arm, which transmitter and receiver are adapted to fold together, battery and line connections for said push-button,
90 said transmitter and said receiver, and a switch operated by the movement of the receiver-arm upon its pivot, for changing the electrical connections within said instrument when the instrument is opened or closed. 95

10. In a telephone, in combination, a tubular handle, studs at the opposite ends of said handle, one of which studs is bifurcated, a tubular arm pivoted between the bifurcations
100 of said last-mentioned stud, a receiver mounted on the opposite end of said arm, a tubular arm extending from the last-named stud and rigidly secured to said stud, a transmitter mounted on the outer end of said last-mentioned arm, which said receiver and transmitter
105 are adapted to be folded together, a push-button mounted on said handle, an induction-coil within the handle, battery and line connections for said push-button, said receiver and said transmitter, electrical contact-points
110 within said bifurcated stud, contact-plates on the pivoted receiver-arm, which contact-points and contact-plates are in electrical connection with the lines within said telephone, whereby the electrical connections in said
115 telephone are changed when the receiver-arm is moved upon its pivot.

11. In a switch for an intercommunicating telephone system, in combination, contact-plates, a pivotal switch-hook, a contact-spring
120 on said switch-hook adapted to engage said contact-plates, a plate having connection with a call-bell, a plate having connection with a line-wire, which last-mentioned plate is adapted to contact said switch-hook, a stud electrically connected with a talking-battery
125 adapted to be engaged by said switch-hook, and a spring for raising the said hook from the call-bell plate to the talking-battery plate, and for electrically connecting said hook with
130 the talking-battery when so raised.

12. In a telephone-switch, in combination, a semicylindrical base, a series of contact-plates arranged about the periphery of said

base, a switch-hook having a pivotal support at or near a point concentric with the curve of the periphery of said base, which switch-hook is adapted to electrically engage said contact-plates as it is moved upon its pivot, an annunciator, a line-wire, means for forming an electrical connection between said switch-hook and said annunciator, means for forming an electrical connection between said switch-hook and said line-wire, and a spring for moving said switch-hook.

13. In a telephone-switch, in combination, a semicylindrical base, a series of contact-plates arranged about the periphery of said base, a switch-hook having a pivotal support at or near a point concentric with the curve of the periphery of said base, a contact-spring on said switch-hook adapted to engage said contact-plates when said switch-hook is moved upon its pivotal support, a plate on the periphery of said base having connection with a line-wire, a call-bell plate also upon the periphery of said base, and a spring for raising said switch-hook from electrical connection with said call-bell plate to the plate having connection with a line-wire.

14. In a telephone-switch, in combination, a semicylindrical base, a series of contact-plates arranged about the periphery of said base, a switch-hook having a pivotal support at or near a point concentric with the curve of the periphery of said base, a contact-spring on said switch-hook adapted to engage said contact-plates, means for adjusting the tension of said spring, a plate about the periphery of said base having connection with a call-bell, a peripheral plate having connection with a line-wire, a stud electrically connected with a talking-battery, which stud is adapted to be engaged by said switch-hook, and a spring for moving said hook from the call-bell plate into electrical connection with the line-wire plate.

15. In a telephone-switch, in combination, a semicylindrical base, a series of contact-plates arranged about the periphery of said base, a switch-hook having a pivotal support at or near a point concentric with the curve of the periphery of said base, which switch-hook is adapted to electrically engage said contact-plates, an annunciator, an electrical circuit, means for forming an electrical con-

nection between said switch-hook and said annunciator, means for forming an electrical connection between said switch-hook and said electrical circuit, a talking-battery, and a spring for raising said switch-hook from electrical connection with the annunciator into electrical engagement with the talking-battery and the electrical circuit.

16. In a telephone-switch, in combination, a semicylindrical base, a series of contact-plates on the periphery thereof, a switch-hook having a pivotal support at or near a point concentric with the curve of the periphery of said base adapted to electrically engage said contact-plates, a plate on the periphery of said base having connection with a call-bell, a plate on said periphery having connection with a line-wire, which two last-mentioned plates are adapted to contact said switch-hook, a stud on said base electrically connected with a talking-battery, which stud is adapted to be engaged by said switch-hook, and a spring for raising said hook from the call-bell plate to the line-wire plate and for electrically connecting said hook with the talking-battery when so raised.

17. In a telephone-switch, in combination, a semicylindrical base having an elongated central opening therein, a series of contact-plates arranged about the periphery of said base on one side of said elongated opening, a switch-hook adapted to sustain a telephone-receiver, having a pivotal support at or near a point concentric with the curve of the periphery of said base, which hook extends through the elongated opening in said base, a contact-spring on said switch-hook adapted to engage said contact-plates, a plate on the opposite side of said elongated opening having connection with a line-wire, a plate having connection with a call-bell, a stud extending into the path of said pivoted hook, which stud is electrically connected with a talking-battery, and a spring for moving said switch-hook from the call-bell plate into electrical connection with the line-wire plate when the weight of the telephone-receiver is removed from said hook.

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Witnesses:

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