

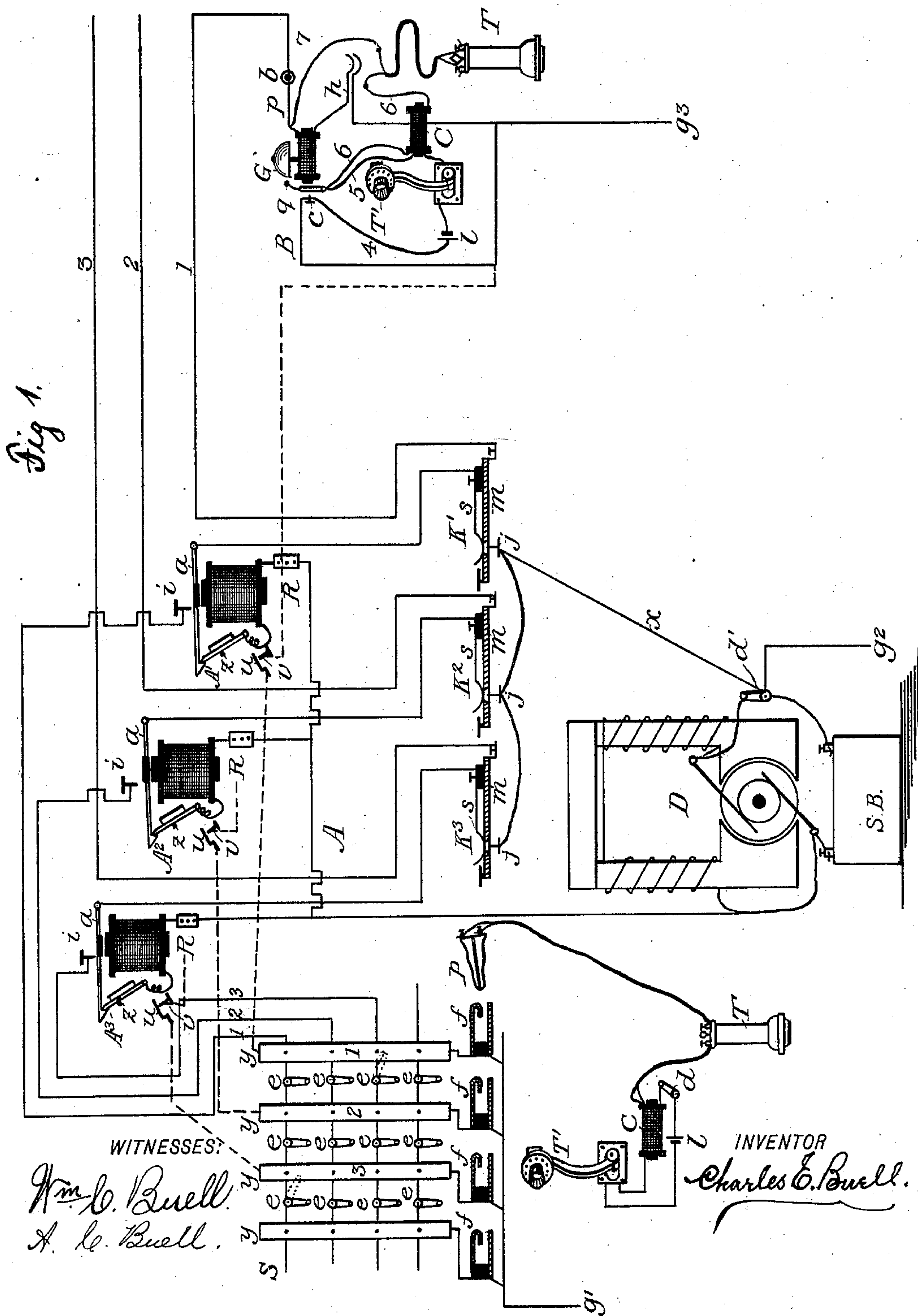
(No Model.)

2 Sheets—Sheet 1.

C. E. BUELL.
TELEPHONE APPARATUS.

No. 576,804.

Patented Feb. 9, 1897.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

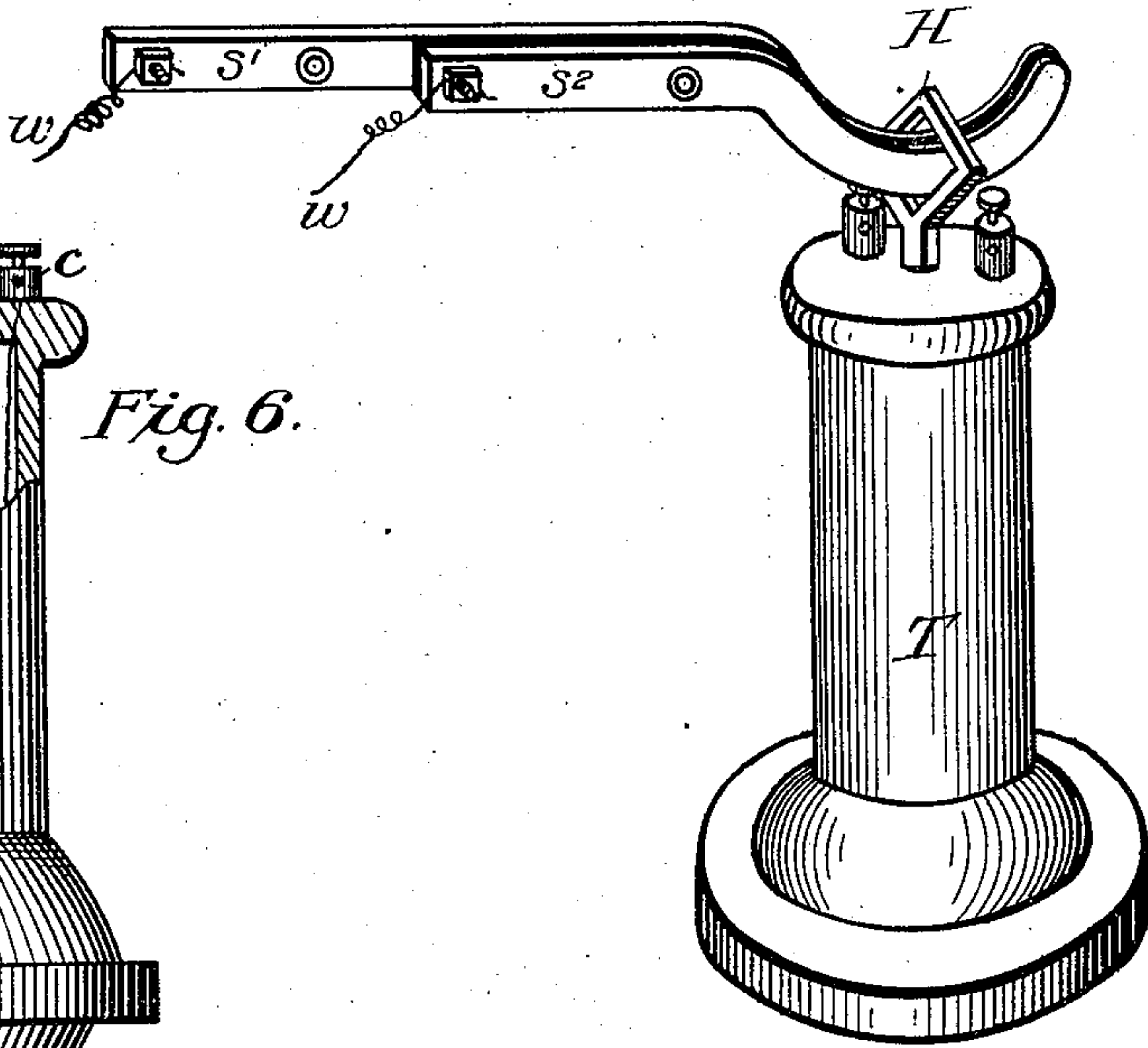


Fig. 6.

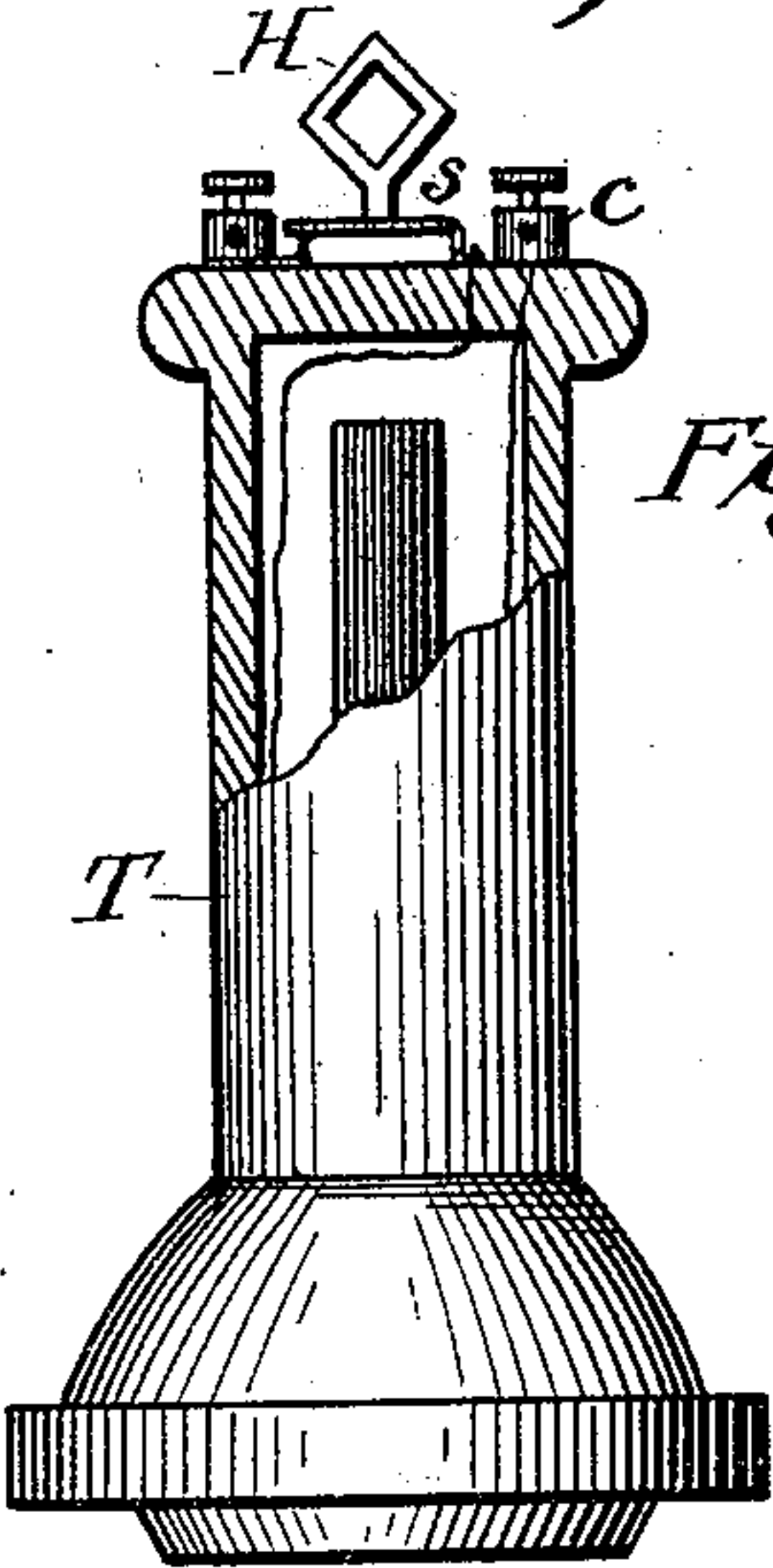


Fig. 4.

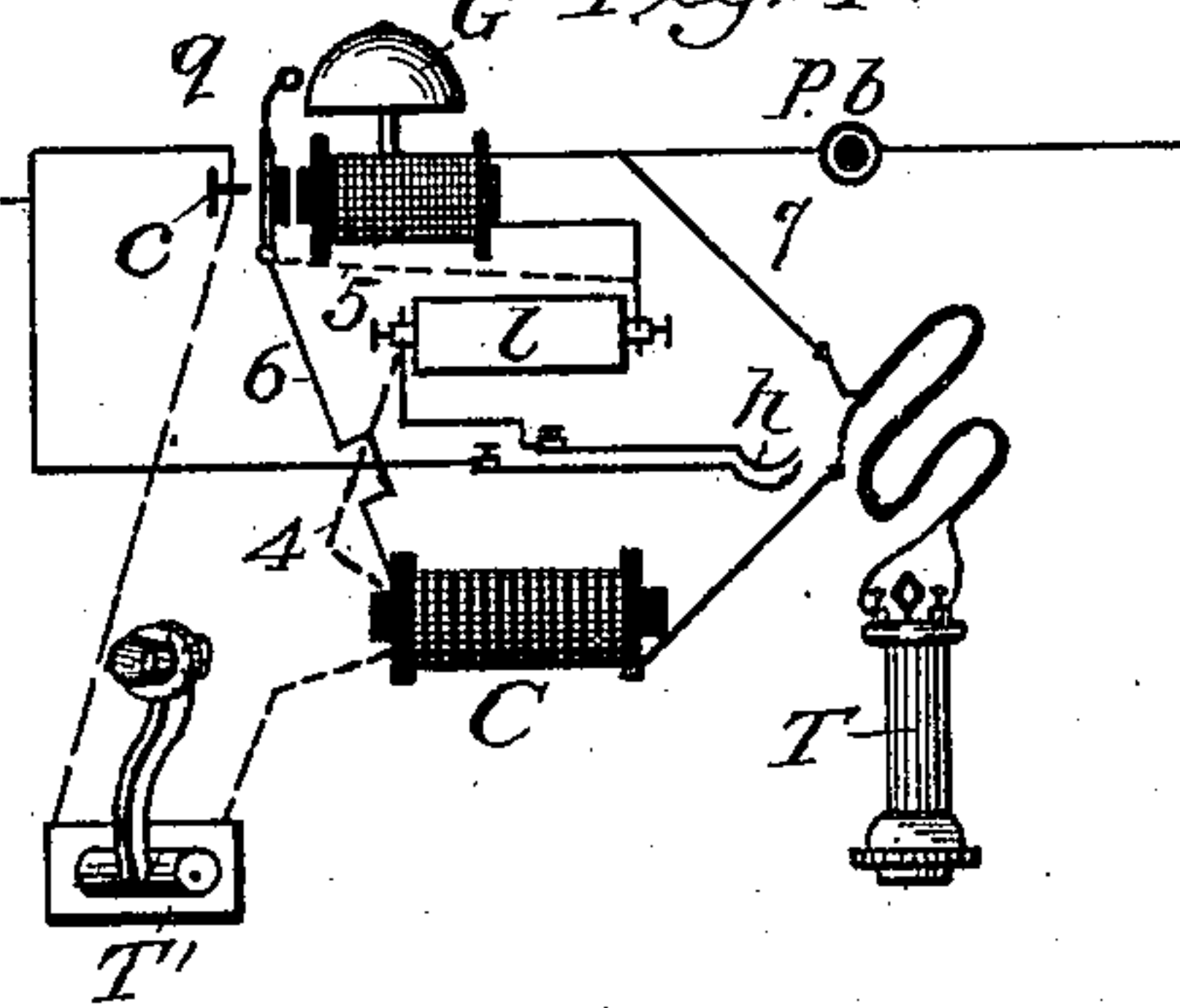


Fig. 5.

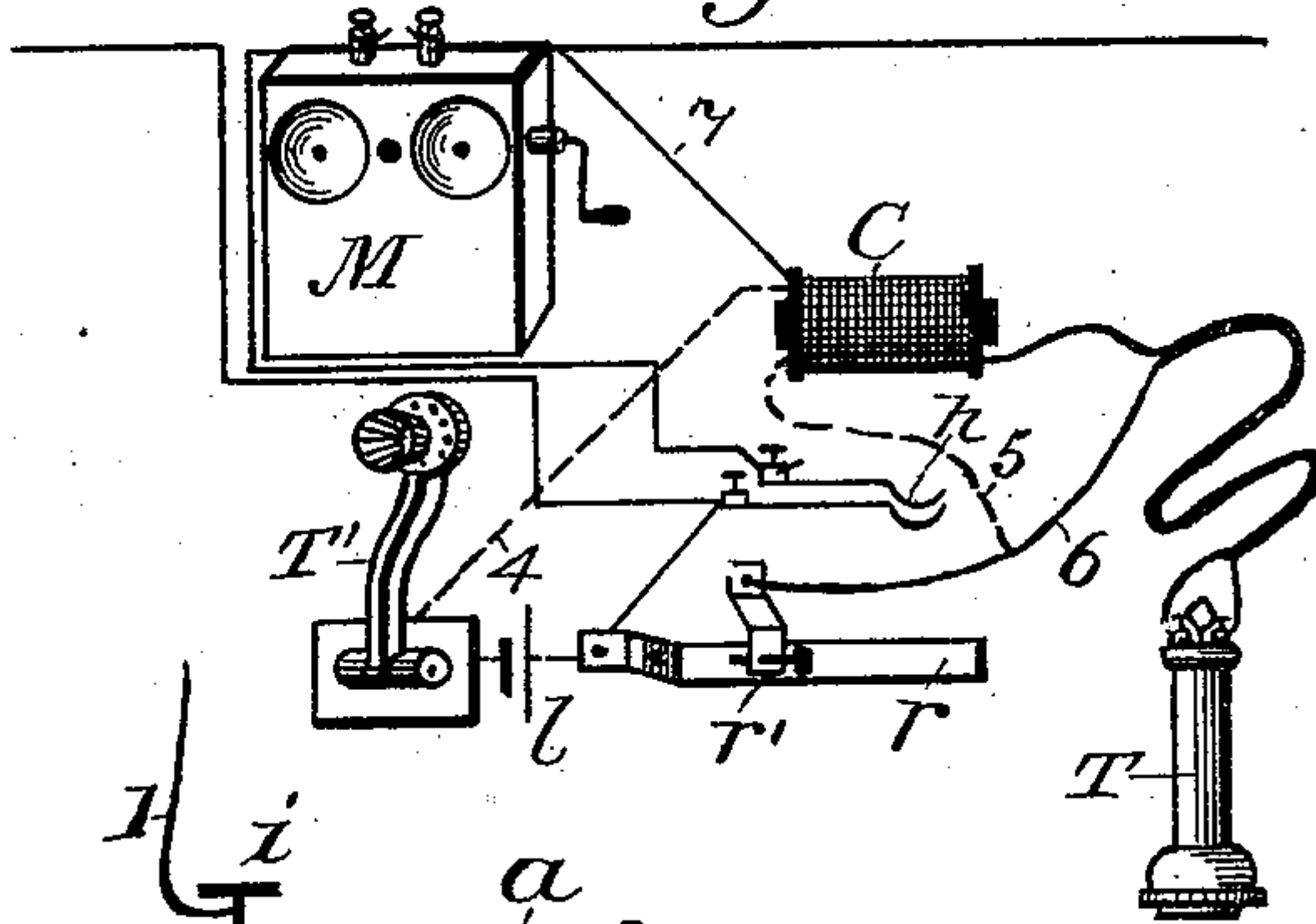
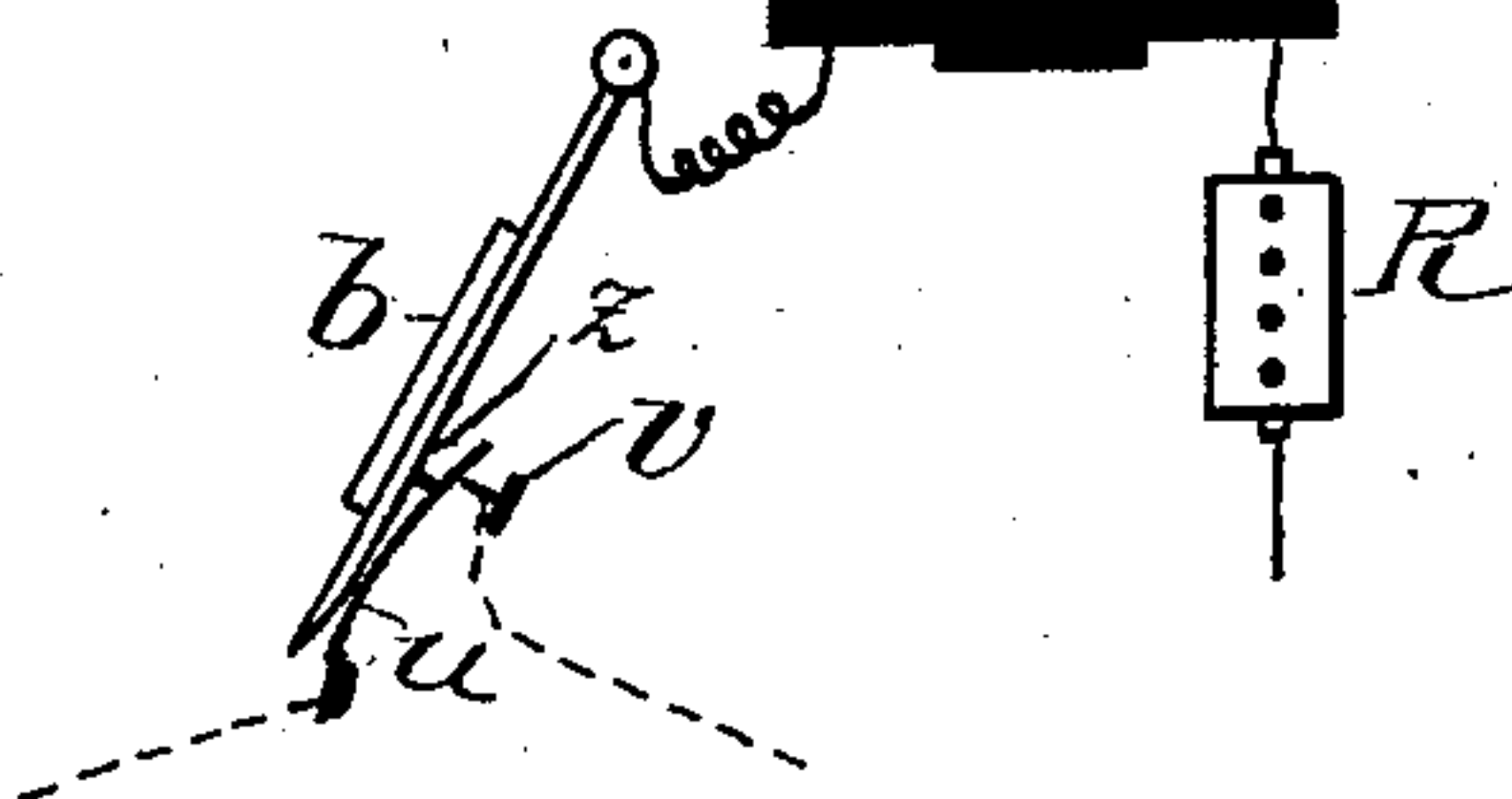


Fig. 2.



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TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 576,804, dated February 9, 1897.

Application filed April 24, 1895. Serial No. 547,005. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, of North Plainfield, Somerset county, State of New Jersey, have invented Improvements in Telephone Apparatus, of which the following is a specification.

My invention consists, primarily, in the combination, with a central-office switchboard, of a series of telephone-lines that are normally disconnected from said switchboard and that include an annunciator in circuit in each of said lines that in its normal operation connects the respective lines to the said switchboard for oral communication and a generator for charging the several lines when the same are not connected to said switchboard, the whole arranged and operating substantially as hereinafter described.

My invention further consists in certain combinations and subcombinations to be hereinafter described.

In the accompanying drawings, Figure 1 shows a system of telephone-lines and a switchboard arranged according to my invention. Figs. 2, 3, 4, 5, and 6 show details of my invention.

In the several figures the same letters and numerals refer to corresponding parts in each.

In Fig. 1 there is shown a series of telephone-lines 1 2 3, each of which includes an annunciator $A' A^2 A^3$, each of the said annunciators being arranged so that the circuit of its respective line is completed over the armature a and the drop b , the several circuits thus formed being normally charged by a current from the shunt-wound dynamo D, which is common to all of the circuits.

A description of circuit 1 will answer for all of the said circuits and is as follows: The line being grounded at g^3 and g^2 , the current from the dynamo D passes through the coil of the magnet of annunciator A' , over drop b , armature a , through key K' , over the line to the subscriber's station B, at which point there is included a calling bell or gong G, a calling-key or push-button $p b$, a hook h , that is composed of two insulated parts, and to earth at g^3 , or to other return-circuit, as shown in dotted line, to be hereinafter described. The current of dynamo D keeps the drop b of annunciator A' normally interlocked with armature a and in the position shown.

When, however, the push-button $p b$ is pressed at station B, the charged circuit is interrupted and the armature a is retracted against contact-stop i , the line being then connected over its branch 1 to the switchboard S of the central station A.

The switchboard at station A is shown as a so-called "Culgan" switch, having swinging arms $e e e$ connected to the lines centering thereat and strips $y y y$, that admit of connecting any two lines for oral communication. By means of the spring-jack switches $f f f$, connecting between strips y and the ground at g' , the telephone apparatus at the central can be connected to line by inserting the plug p in either of the spring-jacks. The central switch and its accessories are well known and require no description, this form of switchboard being used for purposes of simplifying in illustrating my invention.

To send an outgoing signal from central station A, the key K' is pressed, thereby bringing the contact j against spring s , lifting the said spring from contact with the lever, thus opening the branch or loop in which the said key is connected and admitting of sending an outgoing signal to operate the bell G at station B without discharging the portion of the line in which annunciator A' is located, with advantages that are obvious. The pressing of the said key K' connects the dynamo D to the portion of the line that includes the annunciator, but disconnects and opens the portion in which station B is included, and by operating the key K' repeatedly a series of blows will be struck upon the bell G without discharging the annunciator A' , so that the response from station B, caused by pressing the button $p b$, will throw down the drop of the annunciator, affording a return-signal in itself, or the drop can be made to operate a call-bell at central in a well-known manner. (Not shown.)

The drop b of annunciator A' is shown as carrying an insulated pin z , which comes in contact with a spring u , and causing the said spring to connect with a stop v , thereby closing a metallic return-circuit for line 1, the metallic return so operated being shown connected to strip y of wire 1 in the switchboard at station A.

The generator shown is a shunt-wound dy-

namo and has connections to a storage battery S B, thereby affording the advantages of delivering a well-regulated current whether the lines are partly disconnected and when the dynamo itself is not running, as the storage battery will furnish the necessary currents for such occasional use when the dynamo is withdrawn, and when the dynamo is running the storage battery helps to regulate the current delivered to the lines. Other than a shunt-wound dynamo can be used, and any generator of electricity can be used.

The switch *d'* is shown to open the circuit of the dynamo in event of depending upon the storage battery alone. There is shown a resistance R in each of the lines fed by the dynamo to equalize the resistance of a series of lines taking current from a single dynamo or generator, and the said resistances are adapted to be varied to accomplish the regulating of the resistance of the several circuits.

The advantages of a system having the several lines normally out of contact with the central switch are that overcharged wires are not as apt to burn the switchboard, and in the use of the constantly-charged circuits the subscribers' stations can dispense with a magneto-call and can substitute a storage battery that is charged from the line for the local battery ordinarily employed, and with the added advantages of simplifying and cheapening the apparatus to be used in telephone systems at both the central and the subscribers' stations.

In Fig. 2 there is shown an annunciator enlarged to more distinctly present the same. The drop is shown in the position of having been thrown down and of closing the spring *u* against the contact-stop *v* by the weight of the drop *b*. The drop *b* in the position shown in Fig. 2 exposes a number or sign to indicate the line to which it belongs, in the usual manner.

Fig. 3 shows a telephone-support that consists of a hook-like structure composed of two metallic strips insulated from each other and to which the main line is connected by the wires *w w*. The telephone hung upon them by an eye H makes a connection between the insulated strips *S' S²*, and thus closes the circuit with which they are connected. The eye H in the form shown, with angles, instead of being a ring, serves the purpose best, making firm contact. This manner of connecting a circuit by hanging a telephone on a support has advantages as compared with known forms, as the support does not move and a rubbing contact is made when the telephone is hung on the hook thus formed, with obvious advantages.

Fig. 4 shows a subscriber's-station apparatus adapted to be used with a line that is normally charged and is substantially like the subscriber's-station apparatus shown in Fig. 1. T is a receiving-telephone, T' a transmitter, and C an induction-coil; G, a main-line gong or bell, and *p b* a push-button key for sending outgoing signals by breaking the

circuit of the main line when the said push-button key is pressed. The main circuit is normally through the hook *h*, which is a support made like the one shown in Fig. 3 and described. The telephone T and induction-coil C are included in a derived branch comprising wires 6 and 7, and the branch terminates in the armature-lever of bell G, so that this branch is open when the said armature is attracted and is connected to form the main line when the armature is retracted against contact-stop *c*, while the main line is broken at the hook *h* when the telephone T is removed from hook *h*, leaving the bell G in a branch that is disconnected from the main line during the use of the telephone.

A storage battery *l* is shown in the branch that includes the bell G and will be charged when the current is flowing over the said branch. Connections from the storage battery thus charged are made to the transmitter and the induction-coil C, as shown by dotted lines, and the local circuit is completed by the contact of armature *q* and contact-stop *c* when the current is withdrawn from the main line. The wires of the said local circuit are marked 5 and 4. By this arrangement the local and telephone branches are both opened by the attracting of armature *q* and both are closed by the retracting of said armature. This admits of operating the said apparatus from the central station and from the subscriber's station with advantages over known methods. By dispensing with the usual magneto calling mechanism and a local battery that requires constant replenishing the apparatus requires less space, is more simple in construction, and is less expensive to install, while there is less exertion necessary in manipulating the calls and operating the system, and the required tests for trouble on lines is made more simple.

Fig. 5 shows a modification of subscriber's-station apparatus in which the calling mechanism for outgoing signals is an ordinary magneto-call and the local circuit is charged by a battery requiring to be replenished. The manner of connecting the telephone branch is like that in Fig. 4 as regards the use of the hook *h*, the call mechanism being in a branch that is left open when the telephone T is removed from the hook *h*. As it is desirable to open the branch that includes the telephone and induction-coil when the line is not in use for oral communication, a device consisting of a spring-plate *r* and a contact *r'* is shown so located as to have the plate *r* removed from contact with stop *r'* when the telephone T is hung on hook *h* and rests against the plate *r* and to come in contact with stop *r'* when the telephone T is removed from the hook *h*. This device is also so connected to the local circuit as to open the said circuit at the time it opens the telephone branch and to close the local circuit when the telephone branch is closed. In practice this device might be inclosed in a transmitter-box.

or in the casing that contains the magnetocall and only a portion, made to receive the telephone, protrude from the box, the said portion being made to normally stand beyond the said hook, so that the telephone in gravitating to a perpendicular position will rest against the projecting part and press the plate away from the contact r' .

In Fig. 6 there is shown another device for opening the telephone branch when the telephone is hung upon the support. It consists of a supporting-eye H, secured to the telephone by a contact-breaking spring $s c$, which will cause the telephone branch to be opened when the weight of the telephone bears on the spring $s c$, and that will close the said branch when the telephone is taken in the hand and does not bear upon the said spring. This mode of opening the telephone branch, combined with the use of the divided hook h , results in a very simple apparatus for telephone-stations, with advantages in certain uses that would be absent when any known form of apparatus is used.

What I claim is—

1. A charged line, an annunciator in said line, normally open connections from said annunciator to a switchboard, equalizing resistance between said annunciator and a charging-generator, a continuity-preserving key between said annunciator and a charging-generator, and a normally-connected storage battery joined to said generator.

2. A subscriber's-station apparatus that comprises a telephone apparatus in a derived branch, a calling instrument in the main line, a local circuit that includes the primary of an induction apparatus, and connections from said derived branch, and from said local circuit to the armature of the said calling instrument, the whole arranged and operating substantially as described.

3. The combination with a subscriber's station of a telephone in a derived branch, means for disconnecting, and connecting the said derived branch from and to the main line, and devices independent of those used for connecting the derived branch to the main line that are adapted to open the said derived branch by the weight and presence of the telephone.

4. A series of lines radiating from a central station, an annunciator in each line, connections from the several lines to a dynamo, continuity-preserving switches for each line for sending outgoing signals without discharging the annunciator in said line, storage batteries at outlying stations having connections to said lines, and telephone apparatus having connection to said lines, as shown and described.

5. A charged line, an annunciator in said line, normally open connections from said annunciator to a switchboard, equalizing resistance between said line and a charging-generator, a continuity-preserving key between said line and said generator, and ap-

paratus for oral communication having connection to said line.

6. A line having connection to a charging-generator, and to a switchboard, the last-named connection being normally open, an annunciator in said line that is provided with circuit-preserving connections, a storage battery at a remote point having connection to said line through electromechanical switch, and apparatus for oral communication having connections to said line.

7. A series of circuits radiating from a central station and having connection to a charging-generator, and to a switchboard, the last-named connections being normally open, an annunciator in each circuit that is provided with circuit-preserving connections, storage batteries at outlying stations that are provided with connections to their respective circuits through electromechanical switch mechanism, and apparatus at outlying stations for oral communication, having connections to said circuits.

8. A series of circuits radiating from a central station and having connections to a charging-generator, and to a switch-board, the last-named connections being normally open, an annunciator in each circuit that is provided with a target that is adapted to be displayed by a withdrawal of the current from its circuit, and connections from said annunciators to said switchboard, a storage battery at a remote point on each line that is provided with electrical connection to its respective line through an electromechanical switch, and apparatus for oral communication having connections to the said lines.

9. A series of lines centering at a switchboard, annunciators in said lines, a dynamo having connections to said series of lines through regulated branches, a storage battery in the connection from said series of lines and said dynamo, continuity-preserving switches for sending outgoing signals without discharging the annunciators, and storage batteries at outlying stations that have connections to said lines through electromechanical switch mechanism.

10. A series of circuits radiating from a central station, a connection from each circuit to a charging-generator and to a switchboard, devices in each circuit for automatically disconnecting the generator therefrom, a secondary battery at a remote point on each circuit that is provided with connections to its respective circuit that include switch mechanism for disconnecting, and connecting the secondary battery from and to the said circuit, connections from the secondary battery to a subcircuit, and apparatus for oral communication having connections to said circuits.

11. A series of circuits, connections from each to a charging-generator and to a switchboard, an electromagnetic circuit-controlling apparatus, as an annunciator, in each of said circuits, and a device for each at outlying stations, that is adapted to open and vary the said

circuits to indicate a call and to automatically disconnect the said generator from the said operated circuit, a secondary battery at a remote station on each circuit, switch mechanism for connecting and disconnecting the secondary battery to and from its respective circuit, connections from the secondary battery to a subcircuit, and apparatus for oral communication having connections to said circuits.

12. The combination with a subscriber's-station apparatus of a telephone, a switch mounted upon said telephone and adapted to open the branch that includes the telephone by the weight of the suspended telephone, and, an independent switch having connections to a local circuit that is adapted to open said local circuit by the pressure of the suspended telephone resting against said last-named switch.

13. A support for a telephone that comprises two insulated metal strips that are respectively connected to the main line, a supporting-eye secured to the telephone that is of conducting material, and that is provided with angles for securing better contact, and which,

in its normal operation, closes the main line by the weight of the telephone, and connections from the telephone to the main line, substantially as described.

14. A support for a telephone that comprises two insulated metal strips, connections from said strips to the main line, and a telephone to be supported thereon that is provided with an eye of conducting material for closing connection between said strips, that is angular, and is attached to the said telephone by a contact-breaking portion, and connections from the telephone to the main line that include the said contact-breaking portion.

15. A subscriber's-station apparatus that comprises a telephone in a derived branch, means for connecting said branch to and disconnecting it from the main line, and automatic devices for opening the said derived branch when the same is disconnected from the main line.

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Witnesses:

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WM. C. BUELL.