

No. 696,372.

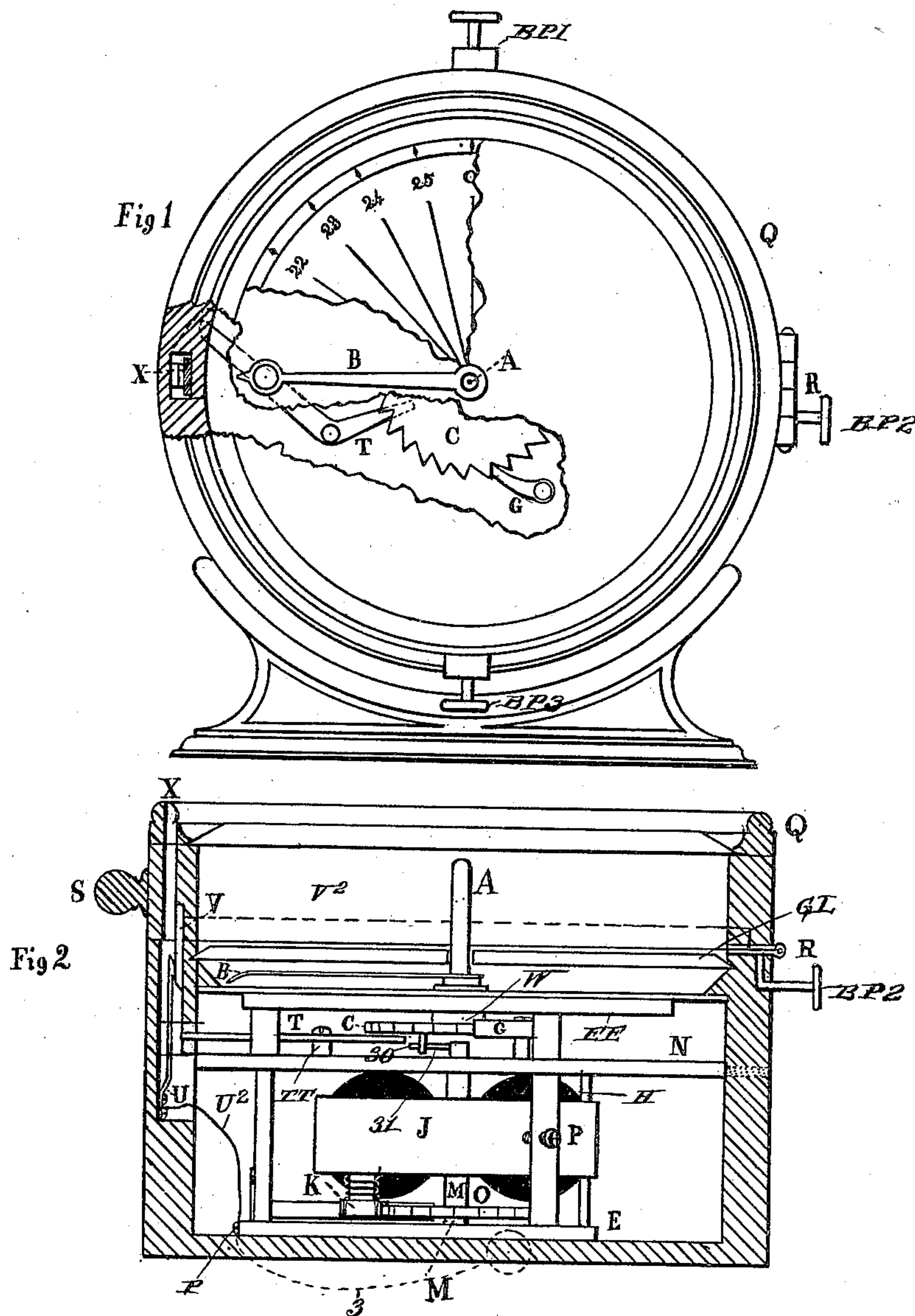
Patented Mar..25, 1902.

F. B. HERZOG.
ELECTRIC SIGNALING APPARATUS.

(Application filed Nov. 11, 1886. Renewed Mar. 1, 1902.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

Wm. S. Paton
E. P. Hopkins

INVENTOR

F. B. Herzog

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3 Sheets—Sheet 2.

Fig 3.

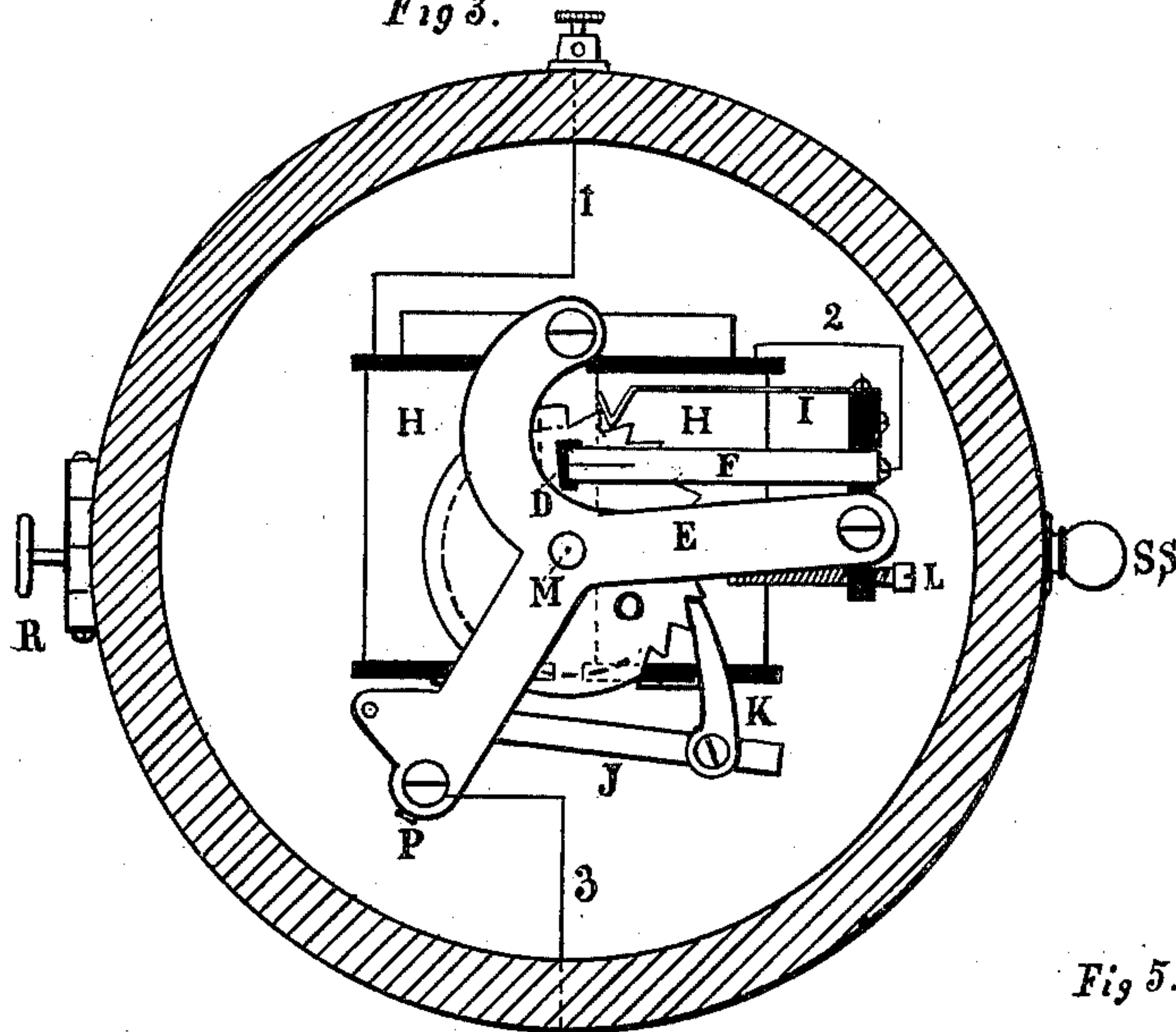


Fig 5.

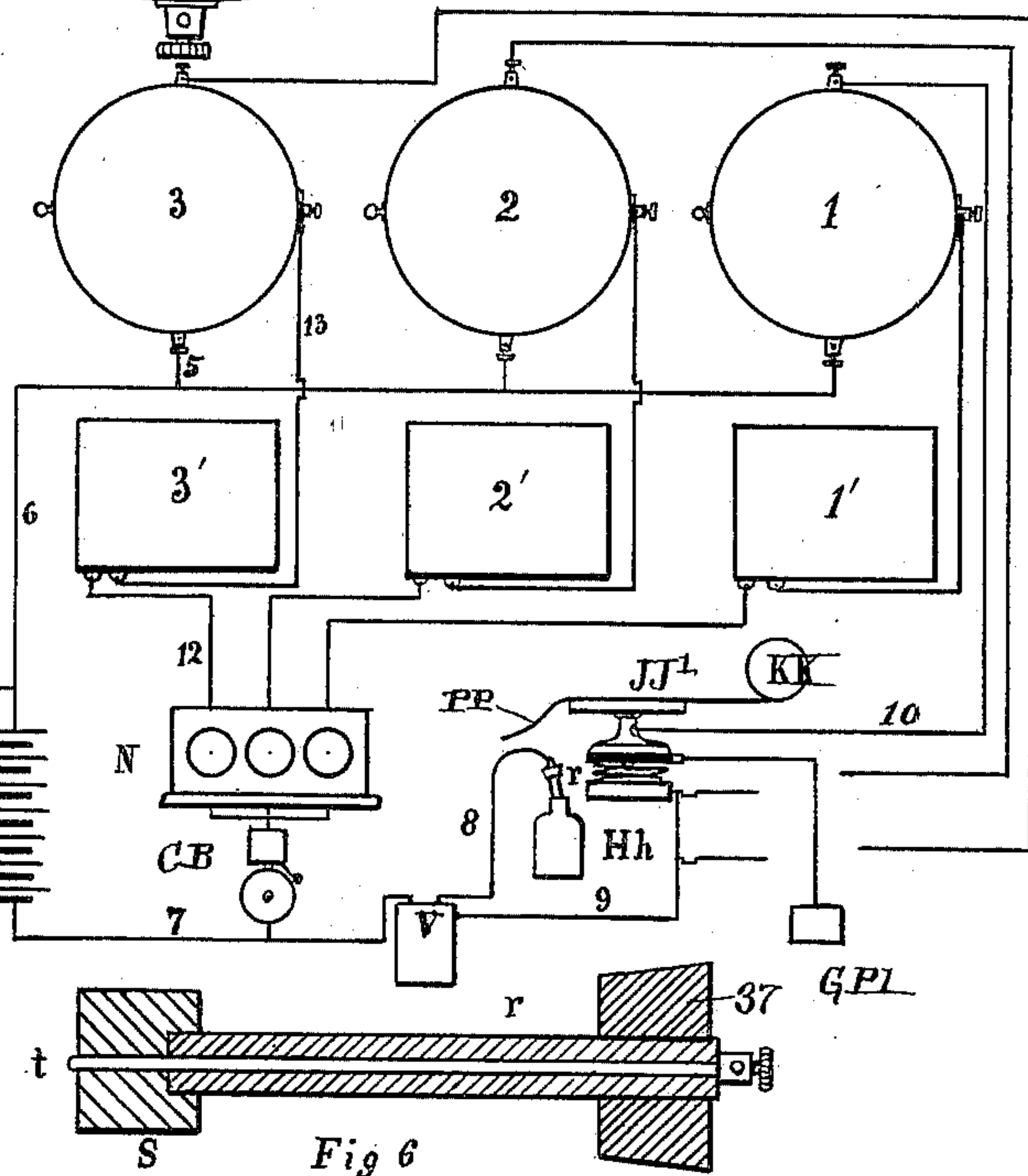


Fig 4.

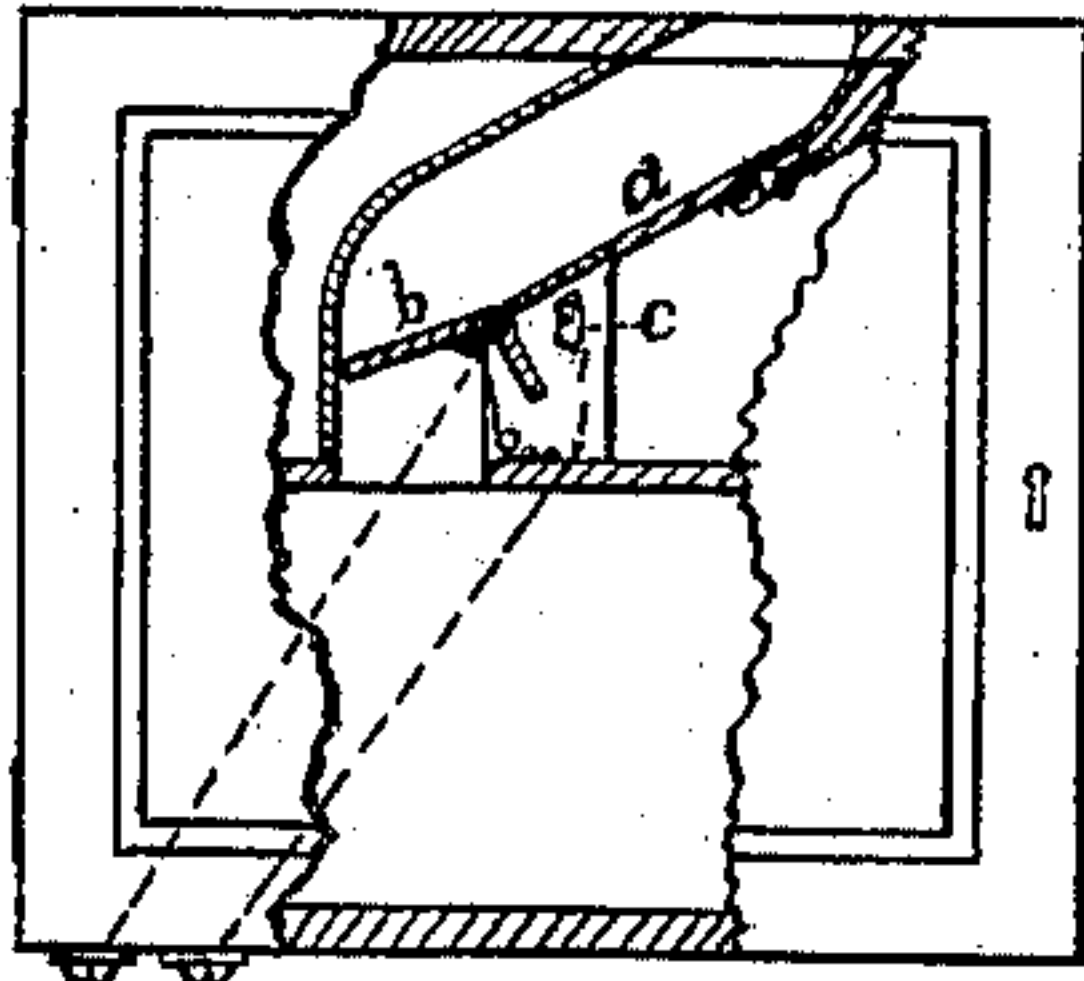
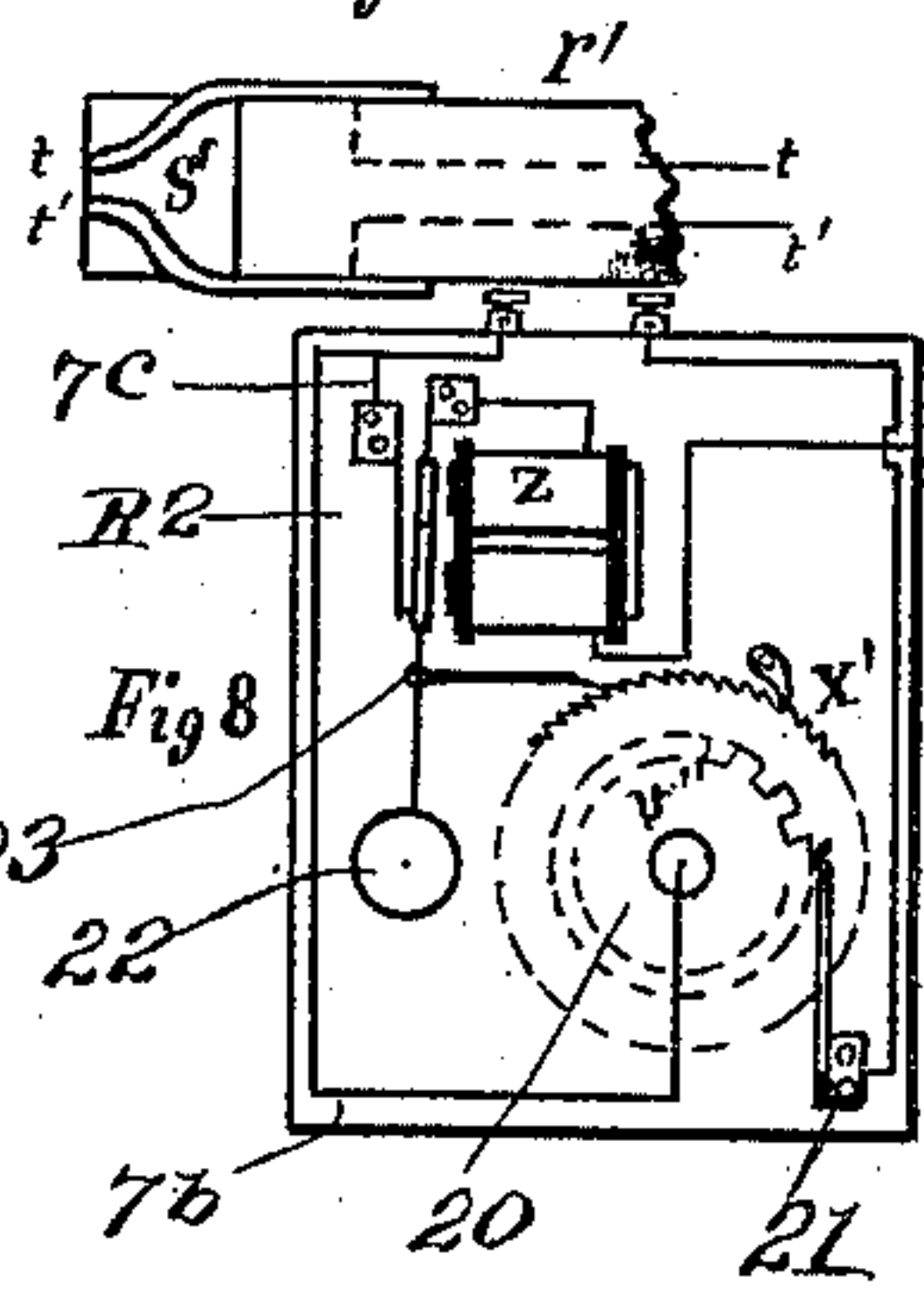


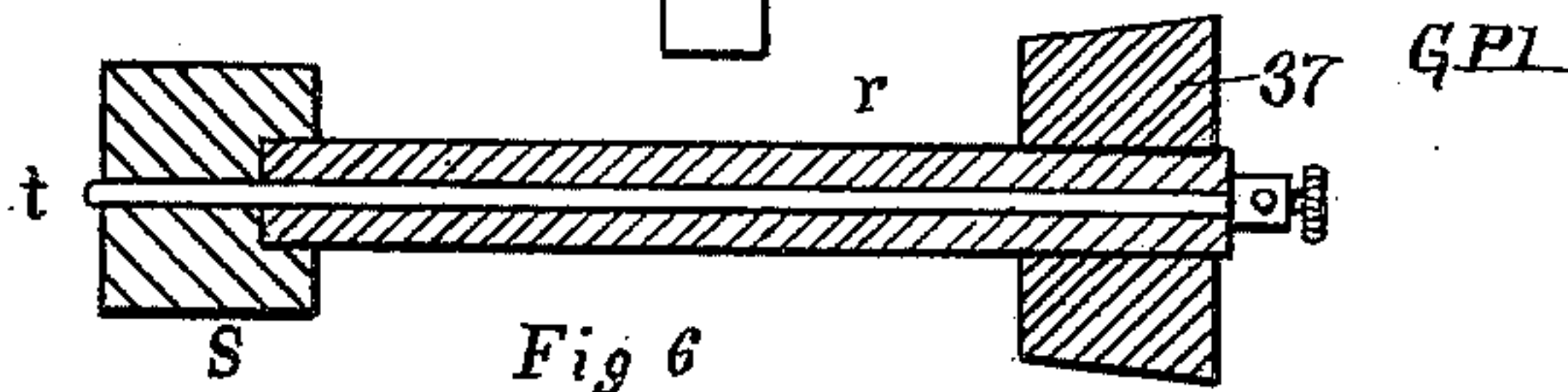
Fig 7.



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Fig 6.



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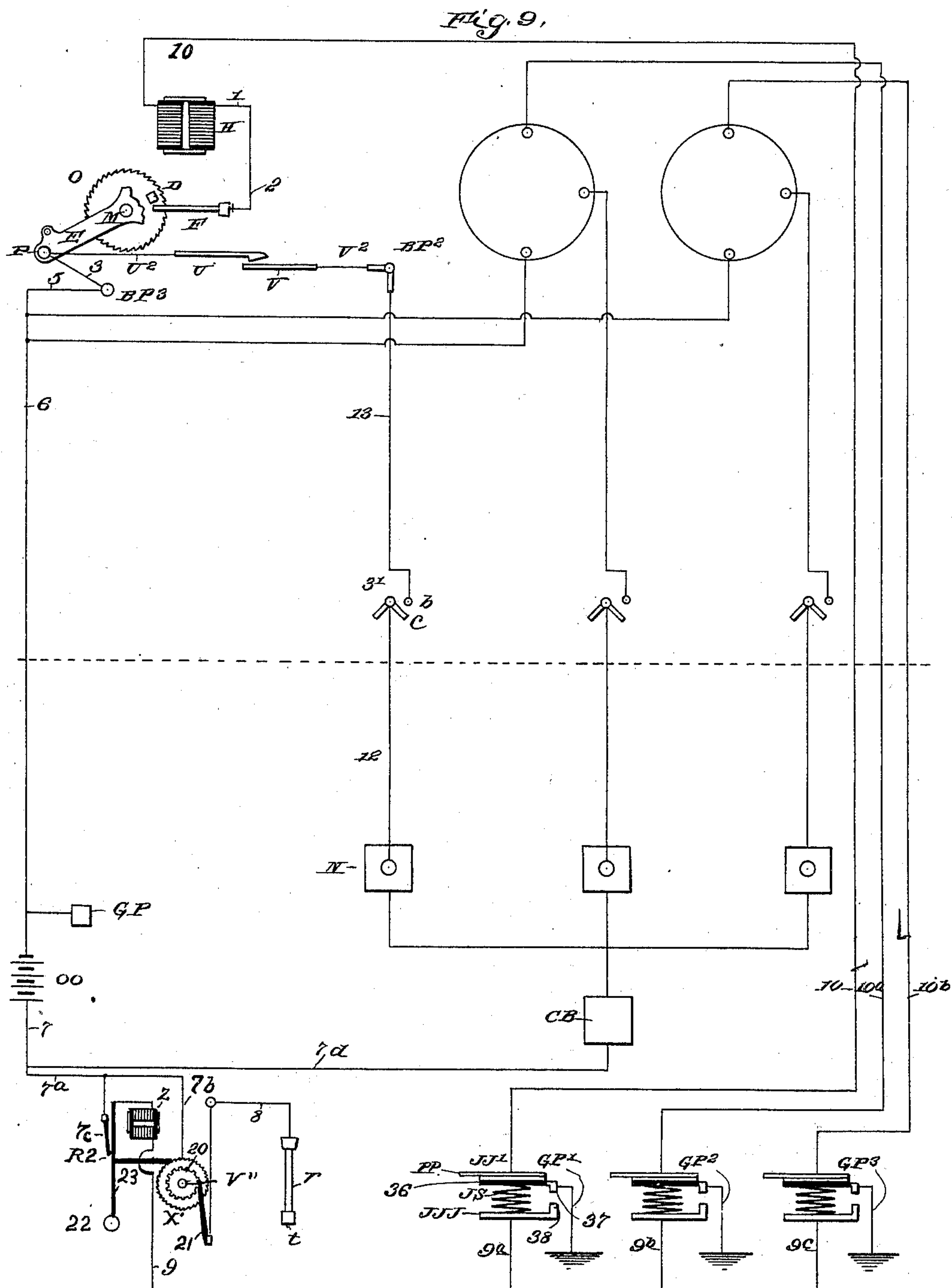
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(Application filed Nov. 11, 1888. Renewed Mar. 1, 1902.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

FELIX BENEDICT HERZOG, OF NEW YORK, N. Y.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 696,372, dated March 25, 1902.

Application filed November 11, 1886. Renewed March 1, 1902. Serial No. 96,288. (No model.)

To all whom it may concern:

Be it known that I, FELIX BENEDICT HERZOG, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Signaling Apparatus, of which the following is a specification.

My invention relates to electric signaling apparatus; and it consists in various improvements therein, as herein set forth.

Referring to the drawings, Figure 1 is the front, Fig. 2 is a central section, and Fig. 3 is a back view of one form of my new signaling transmitting apparatus. Fig. 4 is a combined front and sectional view of another signaling transmitter forming another part of the system. Fig. 5 is a diagram of the circuit system and connections. Fig. 6 is the receiving instrument; Fig. 7, a modification thereof; Fig. 8, a detail. Fig. 9 is an alternative diagram of the circuit and connections.

Transmitter.—Figs. 1, 2, and 3 embody one instance of my new signal-transmitter, among the novel features of which are, first, that it can be set to transmit any one of various signals according as it is set by the transmitting operator, and, if desired, he may change such signal in accordance with a change of intention until the time when the receiving operator (or automatic receiving apparatus) has begun the operation of receiving the signal, after which time the transmitting operator loses all control of the signal; second, that it continues to indicate at the transmitting-station the last signal transmitted, and, thirdly, in many other novel features of construction, only some of which will be claimed herein. In the instance shown as the preferred construction the entire mechanism is inclosed in a box with a cover Q. When the cover is opened, access is given to the spindle A, projecting through glass GL in such a manner that it can be rotated by the fingers of the operator, but in one direction only, as to its other end is fixed a supporting-bushing W, which plays in proper bearings in the frame EE and carries a fixed ratchet-wheel C, which, coöperating with the usual pawl G, permits rotation in one direction only. To the under side of this ratchet-wheel is fixed a pin 30, which as the wheel rotates pushes

before it a lug 31, extending from a second spindle M, to the lower end of which spindle is fastened a second ratchet-wheel O, which is driven in the usual step-by-step manner by magnet H, armature J, and impelling-pawl K and retaining-lock I.

L, Fig. 3, is an adjustable overthrow-stop to lock or limit the forward motion of the wheel O. F is a contact-brush which bears on the surface of the wheel O and in the normal condition of the apparatus rests on the insulating zero-spot D, the use of which will be explained hereinafter. The hand B and the pin 30 on the ratchet-wheel C are fixed in relation to each other, as also are the lug 31 on the shaft M and the zero-spot D on the wheel O, all combining so that after the spindle A has been rotated sufficiently to bring the coöperating pin 30 and lug 31 together the indications on the dial over which B plays will correspond to the relative positions of the zero-space, (and the point of the brush F,) and hence of the signal which the apparatus is then in a condition to transmit. If in setting the hand it has passed beyond the desired indication, the spindle can be rotated still farther, so as to bring the pointer for a second time to the desired indication. There are as many teeth on the step-wheel as there are signal indications to be transmitted. The magnet described is controlled to move the second ratchet-wheel O step by step, one step for every impulse of the magnet, and these impulses are sent from the receiving-station in a manner to be described hereinafter. At every step of the wheel the insulated zero-spot D (which may either be a hole in the metal wheel or a rubber insertion) is advanced one step nearer the fixed position of the coöperating contact-brush F, and therefore it will take a fixed number of steps of the wheel to bring it from a position of rest to a position in which the insulated spot will be carried under the point of the contact-brush. As the magnet H is arranged in series with this brush and the metal of the wheel, it is obvious that as soon as this occurs further advance of the wheel will be impossible, because the magnet will be cut out of action. The method of operation to be described more in detail hereinafter is that impulses or current interrup-

tions are originated and counted at the receiving-station, and for every such impulse the transmitter is advanced one step until it can advance no more, because the circuit is broken at the instant that it is at the step, when the magnet is cut out by the arrival of the insulated spot under the brush. The receiving apparatus at the receiving-station is in series with this magnet, and it also will be affected by this interruption. Therefore the number of steps made by the magnet and wheel in the transmitter would be indicated by the number of impulses marked at the receiver, and from this number the position of the transmitter at starting can be instantly deduced. This transmitter is what I have in a number of patents called an "impulse-actuated transmitter of the latent-signal type," in contradistinction to a spring-actuated transmitter, in the usual forms of which the impulses which actuate the receiving apparatus are originated in the transmitter instead of at the receiving-station and in which instead of the step-by-step impulse-motor there is a spring-actuated clockwork, which controls an impulse of the break-wheel. Other forms of impulse-actuated transmitter are those in which instead of the permanent rupture at the end of the circuit, as in the form herein shown, the differentiation-point is marked by a temporary break or change in potential, as shown in my United States Patent No. 292,115. This explanation is necessary in view of the fact that some of the receiving apparatus described hereinafter is shown as adapted with slight modifications to control the reception of signals from transmitters of the other types just referred to.

The step-by-step movement just described operates to bring the zero or differentiation spot to its normal position of rest under the contact-brush, the motion being such as to bring the spindle of the ratchet-wheel O (and hence the lug 31 on that spindle) away from the pin 30 on the ratchet-wheel C, with which pin 30 the said lug 31 is normally in engagement at the moment when the setting operator has finished setting and before the second spindle has been moved by the step-by-step motion, the result of this being that though the lower spindle, with its wheel, changes position the upper spindle and its wheel, as well as the pointer showing over the dial, are left where they were placed, and thus serve to mark the signal last sent.

Detector mechanism.—As so far described the transmitter is complete and has a number of novel characteristics; but in order to protect the detector-hand against accidental or intentional interference I add the following novel apparatus: I so construct the hinged cover of the case that the hasp-lug V, entering the latch U, is caught by it. This serves, in addition to its function as a catch, to complete the circuit which leads by wire V² to the hinge R and as described hereinafter. The box remains locked until after the time when,

after the apparatus is again at zero, as far as its transmitting mechanism is concerned, an operator or attendant opens it by inserting a suitably-shaped key into hole X, and thereby pushes aside the catch U. After the box has been opened and the position of the detector-hand B found to agree with the signal received and attended to the attendant moves this hand back to its normal or zero position, and thereby causes the pin on wheel C to push elbow-crank T (fulcrumed on TT) into such position that its longer arm moves the catch U away from possible engagement with the hasp V, and thus prevents the box from being locked except when it is in condition to transmit some signal.

Coin-controlled mechanism.—As so far described, the apparatus is in all respects operative; but for certain purposes, where it is necessary for the receiving operator to have further guarantee that the instrument has been properly set or if not that any trouble incident to its operation will be paid or vouched for, I combine therewith the apparatus shown in Fig. 4 and typified as 1', 2', and 3' in Fig. 5. This consists of a box in which is cut a slot (just large enough to admit a coin or disk of a given size) which opens into a passage, at the end of which is a spring-trap b, which is deflected by the weight of the coin or disk, which if large enough to fully open the trap will as it falls to the lower receptacle cause the circuit to be made by engagement of b and c and will operate the corresponding drop in the annunciator N, Fig. 5, the circuit being as follows: battery OO, bell CB, corresponding drop in N, 12, coin-contacts b and c, wire 13, hinge R, wire V², hasp and latch V U, wire U², junction-screw P, frame E, wires 3, 5, and 6, and back to battery.

Receiving-station apparatus, for the fullest embodiment of the invention, comprises the manipulative instrument or electrolytic pen shown in Fig. 6, the automatic circuit-controlling device, including the rheotomic motor, shown in detail in Fig. 8, an annunciator with a suitable drop or other indicating device for each line, shown collectively, as N, with a common alarm, shown as a bell, (see B in Figs. 5 and 9,) and a separate switching device JJ', there being one such device for each substation where the apparatus is arranged to cooperate with more than one station. In addition to these parts there is a ground-plate GP on one side of the battery and a corresponding ground for each of the switching devices JJ', although it is obvious that one ground connection may be arranged to cooperate with a number of these.

The manipulative pen shown in Fig. 6 consists of a holder or handle r, containing a stylus t, of tin, platinum, or iron, as the case may be. Surrounding this stylus on the sides, and so that the pin may protrude a trifle, or otherwise placed in such proximity to it that a portion of it will precede the stylus as the holder is drawn over the paper is a collar or

pad S, of suitable absorbent material, such as felt or sponge. This holder or pen is normally kept in a suitable receptacle, as the jar Hh, Fig. 5, and a suitable cork or extension 37 prevents the evaporation of the liquid. This bottle contains an aqueous solution of potassium iodid or any other solution adapted to coöperate with the metal of which the stylus is made, so as to produce the electrolytic mark when a current passes through a sheet of paper wet with this solution in a manner well known in chemical telegraphy. This instrument is designed to be brought into relation with the circuit in any suitable manner. For instance, as here shown, the binding-post at the upper end is designed to receive a flexible wire connection 8, and the apparatus is designed to be taken from the bottle when required and drawn over a strip of paper, so that while current flows through the circuit with which it is connected a mark will be made on the paper, and this mark will cease as soon as the current ceases, it being understood that on the other side of the paper is a suitable metal plate representing the continuation of the circuit. A modification of this device is shown, as Fig. 7, in which there are two styluses t and t' , forming a loop, each connected to a circuit extension, the first being connected as before, and the connection of the second representing the equivalent of the metal which in the first form would be under the paper. The absorbent pad S, as before, preceded the stylus, thus preparing the otherwise unprepared paper to receive the mark. I consider this device so novel that it may be varied widely without departing from the general purposes of the invention. As herein shown, the paper PP designed to receive the mark is a tape wound on a reel KK, there being one such reel for each of the switching devices.

The rheotomic circuit-controlling device. shown in detail in Fig. 8 and represented typically as V', Fig. 5, comprises, essentially, a break-wheel 20, having a number of teeth to operate with the contact-brush 21, so that as the wheel revolves it will cause successive impulses in the circuit. This wheel is mounted on the shaft V'', upon which is also mounted a step-by-step or impulse wheel X', the latter driven by magnet Z and impulse-pawl 23, regulating-weight 22, and the ordinary self-circuit breaking or trembler contacts R². The circuits in this rheotome are from the battery end a wire 7^b, connected to the break-wheel, (as through the shaft V''), and thence out to the contact-brush and out to the manipulative instrument or pen and a second circuit or branch 7^c, including in series rheotome-contacts R² and the magnet Z, and then by common wire 9, leading to branches 9^a 9^b 9^c, &c., to the respective switching instruments.

General circuit organization, as shown fully in Fig. 9, comprises battery OO and the

general return-wire 6, this having suitable legs 5 corresponding to each substation, the connection from this side of the battery being for the purposes of illustration considered as a general return. From each substation two wires lead to the central station, one wire being the call-wire and comprising the hasp in the box, as well as the coin-controlled device at each substation, and having at the central station the individual annunciator-drop and a common bell, and each second wire may be considered as the releasing-wire and has at the substation the circuit-closing device directly controlled by the transmitter as the signal is set and having at the receiving-station the individual switching device JJ', designed to operate successively, but in common with the common battery-wire, through the receiving-pen and signal-controlling apparatus, shown as the break-wheel, in conjunction with these circuits. Special form of branch circuit is shown adapted to operate the particular form of device here selected for illustration as a typical embodiment for this portion of the invention. These branch circuits are operated by the main battery through the common ground-plate at the farther end of the battery and the grounding devices GP', &c., connected with each of these switching devices as a whole. These ground branches are arranged to control the motor portion of the rheotome when a rheotome is chosen which is to be driven in this manner. This portion of the invention has particular merits of its own and is adapted to be used in other relations, but is not essential to the operation of modified forms of the rest of the apparatus.

Individual switching device.—This comprises a plate JJ', supported by a spring JS in such manner that when the plate is depressed by the pressure exerted by the switching operator when he uses the electrolytic pen it will cause contact to be made between the contacts 37 and 38 and to break this contact when the pressure is removed. The plate JJ' is in electrical connection with the releasing-wire 10, but is insulated in some suitable manner, as by the rubber plate 36, from any connection with the parts GP', 37, 38, and JJJ, which coöperate with the rheotome.

General operation.—When a transmitter is set, the circuit is completed from the battery to wires 6 5 3, framework E, circuit-wheel O, brush F, magnet H, and releasing-wire 10, but remains open at the switch JJ' until the receiving operator closes the circuit thereat by the application of his pen to the paper normally resting on this plate, whereupon the circuit will be completed through this pen and rheotome back to the battery. When the teleseme has been set, no effect is produced at the central station, because to produce this effect a branch circuit must be closed from the metal frame E through the hasp and hinge of the transmitter and then through the sup-

plementary coin-call, if this be used, and through the calling-line 12 to the individual drop in the annunciator, and by way of the branch 7^d back to the pin 7 and the battery.

5 As soon as the receiving operator notes this call (or, if in a manner analogous to that described in other patents of mine relating to this same general system of signaling, it be
10 ceiving-station irrespective of the receipt of any notification or call therefrom) the operator completes the circuit by touching his pen to the desired one of the plates JJ'. As the motive device of the form of transmitter here-
15 in shown is, as already described, of the impulse-actuated variety, it is necessary that a series of impulses be produced at the receiving-station, so as to drive the impulse-motor in the transmitter, and these impulses may
20 be produced there by successive taps of the electrolytic pen on the paper, thus causing successive energizations of the circuit or by automatic mechanism, which may be of any suitable kind—as, for instance, a mechanical
25 releasing detent or spring motor—to operate a suitable circuit-controlling wheel, but, as here shown, is the special form of rheotomic impulse-driven break-wheel. If the trans-
30 mitter used were of the spring-motor type, this rheotome would not be necessary and the pen could be drawn along the paper and the successive interruptions would be marked by it, although produced at the trans-
35 mitter. In the form here shown the pen is drawn along the paper and produces a number of marks corresponding to the number of im-
40 pulses which the transmitter will control before its circuit is broken by the zero-spot D, and these impulses are produced by the ac-
45 tion of the controlling-wheel at the receiving-station, and this wheel in turn is moved by the rheotome-motor, which is brought into operation by the depression of the switch-
50 ing plate JJ' and is again cut out when this plate rises, because the pressure of the operator's hand is removed therefrom. It will be noticed that the operator may with one hand control the manipulative instrument or pen and also control the switch which controls the
55 rheotomic impulses sent to line.

It will be seen that though all of the features herein shown are parts of one organiza-
tion some of them can be used without others, and most of these parts can be greatly varied without departing from my invention.
55 For instance, for the impulse-actuated latent signal transmitting there could be easily substituted a spring-actuated latent signal-trans-
60 mitter as far as the detector-hand or the automatic lock or the supplemental coin-call are concerned, in which case the operation of closing the door or inserting the coin would
65 by directly or indirectly releasing a detent cause the apparatus to be released directly. In like manner most of the circuits can be changed. Many of such changes applicable

to the present instance are to be found in pending applications for patents connected with my system.

I claim—

1. The combination, substantially as described, in variable electric signaling apparatus of the signal-transmitting mechanism; signal-detector mechanism for marking at 75 the transmitter the last signal transmitted; a locking device controlled thereby; and signal-varying mechanism controlled by the signal-detector mechanism.

2. A signal-transmitter comprising nor- 80 mally open circuit-terminals and a circuit-closer for the same, a signal-setting device controlling such circuit-closer, and a supplementary circuit-closer in the aforesaid circuit, substantially as described. 85

3. A signal-transmitter comprising nor- mally open circuit-terminals and a circuit-
90 closer for the same, a signal-setting device controlling such circuit-closer and a supplementary circuit-closer; the said closer closing a supplementary break in the aforesaid
95 circuit until again manually operated, substantially as described.

4. A signal-transmitter, comprising nor- mally open circuit-terminals, and a circuit-
100 closer for the same, a signal-setting device controlling such circuit-closer; and mechanism for reopening the circuit, substantially as described. 95

5. A signal-transmitter, comprising nor- 100 mally open circuit-terminals and a circuit-closer for the same, a signal-setting device controlling such circuit-closer and a supplementary circuit-closer connected to a device
105 arranged to prevent access to the signal-setting mechanism, substantially as described.

6. A signal-transmitter comprising nor- mally open circuit-terminals, and a circuit-
110 closer for the same, controlled by a signal-setting device; and a supplementary circuit-
115 closer comprising a hinged device adapted to be swung in front of the transmitter-setter device.

7. A signal-transmitter, comprising nor- mally open circuit-terminals, and a closer for
115 the same, controlled by a signal-setting device; and a supplementary circuit-closer, comprising a hinged device adapted to be swung in front of the transmitter-setter de-
120 vice, and comprising a locking-hasps, the parts of which form the circuit-terminals.

8. A signal-transmitter comprising a set- ting device manually operated by means of a
125 spindle and a supplementary circuit-controller comprising a lever, mounted so that it may be brought into position to prevent further
130 access to the said spindle, and controlling the circuit when so moved.

9. A variable-signal transmitter compris- ing normally open terminals; a setting de-
130 vice for closing these manually; means for varying the signals; a dial and pointer for indicating what signal is set; a magnet for re- opening the terminals; together with an ele-

ment arranged to be moved so that in one position it prevents the operation of the setting device and at the same time permits observation of the dial and pointer, substantially as described.

10. The mechanically-detached but electrically-connected manual electrolytic receiver, comprising a vehicle for holding electrolytic solution, and, in close relation thereto, one or more electrodes; whereby in the passage over the paper or recording surface, the said solution will be spread in the path of the terminal.

11. A receiving device comprising a record-surface and a manually-movable element, the latter carrying an electrolytic stylus connected by a flexible connection to a suitable circuit, and carrying also a device for holding and delivering into operative position with respect to the stylus and the surface a supply of electrolyte; whereby an electrolytic record may be produced during the manipulation of the stylus upon an unprepared surface, substantially as described.

12. A receiving device, comprising a record-surface and a movable element, the latter carrying an electrolytic stylus connected by a flexible connection to a suitable circuit, and carrying also a device for holding and delivering into operative position with respect to the stylus and the surface a supply of electrolyte, said device consisting of an absorbent body or reservoir; whereby an electrolytic record may be produced during the manipulation of the stylus over an unprepared surface.

13. A circuit-controlling apparatus comprising normally open terminals cooperating, by way of suitable circuit connections, with apparatus at a distant point; means whereby a signaling operator is enabled to join these terminals manually; a magnet arranged to control the opening of a cooperating circuit magnetically as the result of operation at a distant point; and means for hindering the manual reopening of the circuit by the signaling operator prior to the magnetic operation, substantially as described.

14. A circuit-controlling apparatus comprising normally open terminals cooperating, by way of a circuit, with apparatus at a distant point; means whereby a signaling operator is enabled to join these terminals manually; a magnet arranged to control the subsequent separation of these terminals magnetically as the result of operation at a distant point; and means for hindering the manual reopening of the circuit by the signaling operator prior to the magnetic opening, substantially as described.

15. A circuit-controlling apparatus comprising normally open terminals, cooperating, by way of suitable circuit connections, with apparatus at a distant point; means whereby a signaling operator is enabled to join these terminals manually; a magnet arranged to control the opening of a cooperating circuit

magnetically as the result of operation at a distant point; independently-operating devices for controlling this distant operation; and means for hindering the manual restoration of the normal conditions by the signaling operator prior to the independent magnetic opening, substantially as described.

16. At each of several substations, a circuit-controlling apparatus, comprising normally open terminals cooperating, by way of suitable circuit connections, with apparatus at a distant point; means whereby a signaling operator is enabled to join these terminals manually; a magnet arranged to control the opening of a cooperating circuit magnetically as the result of operation at a distant point; and, at such distant point, a switch-terminal for each outlying station and circuit connections for bringing a common element into separate cooperation with the respective switch-terminals and thereby controlling the operation of the magnet; and for hindering the manual opening of the circuit by the signaling operator during the period between the manual closure and the magnetic opening, substantially as described.

17. At each of several substations a circuit-controlling apparatus comprising a normally open break to a circuit leading separately for each substation to a common station; means whereby a signaling operator is enabled to close this break manually, and means whereby it is kept closed; a magnet in series arranged to control the subsequent reopening of the circuit at each substation; a second line from each substation apparatus, including, at each substation, a normally open break in that circuit, together with means for closing this manually, said line also including at its other end, an annunciator operated upon the closure to locate the corresponding station; at the first-named common station, a contact-plate for each of the first series of lines, and a common element arranged and adapted to cooperate separately so as to close the circuit from a common source of current, and through a common connection to each of these lines through its contact-plate, and thereby control the operation of the magnets and the reopening of the circuits at the respective substations, substantially as described.

18. A motor-controlled signaling apparatus at one station, and at a second station a controlling apparatus for the same comprising a surface adapted to receive paper for a record, a manipulative instrument, or pen, adapted to record on the paper and to control the motor, together with a switch, including a yielding support, and operated by pressure of the hand which directs the pen.

19. A circuit-controlling switch, including a plate adapted to move to and fro, contacts relatively placed so as to be relatively movable in accordance with the movement of the plate, a record-surface on the plate, and a recording-pen adapted to record on the surface; the parts being relatively placed and arranged

that an operator may with one hand make the record and control the switch.

20. A circuit-controlling switch, including the horizontal plate, a yielding support for
5 the same, a circuit-controlling device controlled by the motion of the plate with reference to its support; a reel, adapted and placed to feed a strip of paper over the plate, a circuit-controlling manipulative instrument,
10 adapted simultaneously to mark the paper and control a circuit; all arranged and cooperating so that an operator may, with one

hand control a circuit by the movements of the pen, make a record on the paper, and control the switching by variation of the vertical
15 motion of his hand.

Signed at New York, in the county of New York and State of New York, this 6th day of November, A. D. 1886.

F. BENEDICT HERZOG.

Witnesses:

WM. H. CARR,
AUSTIN TYLER.