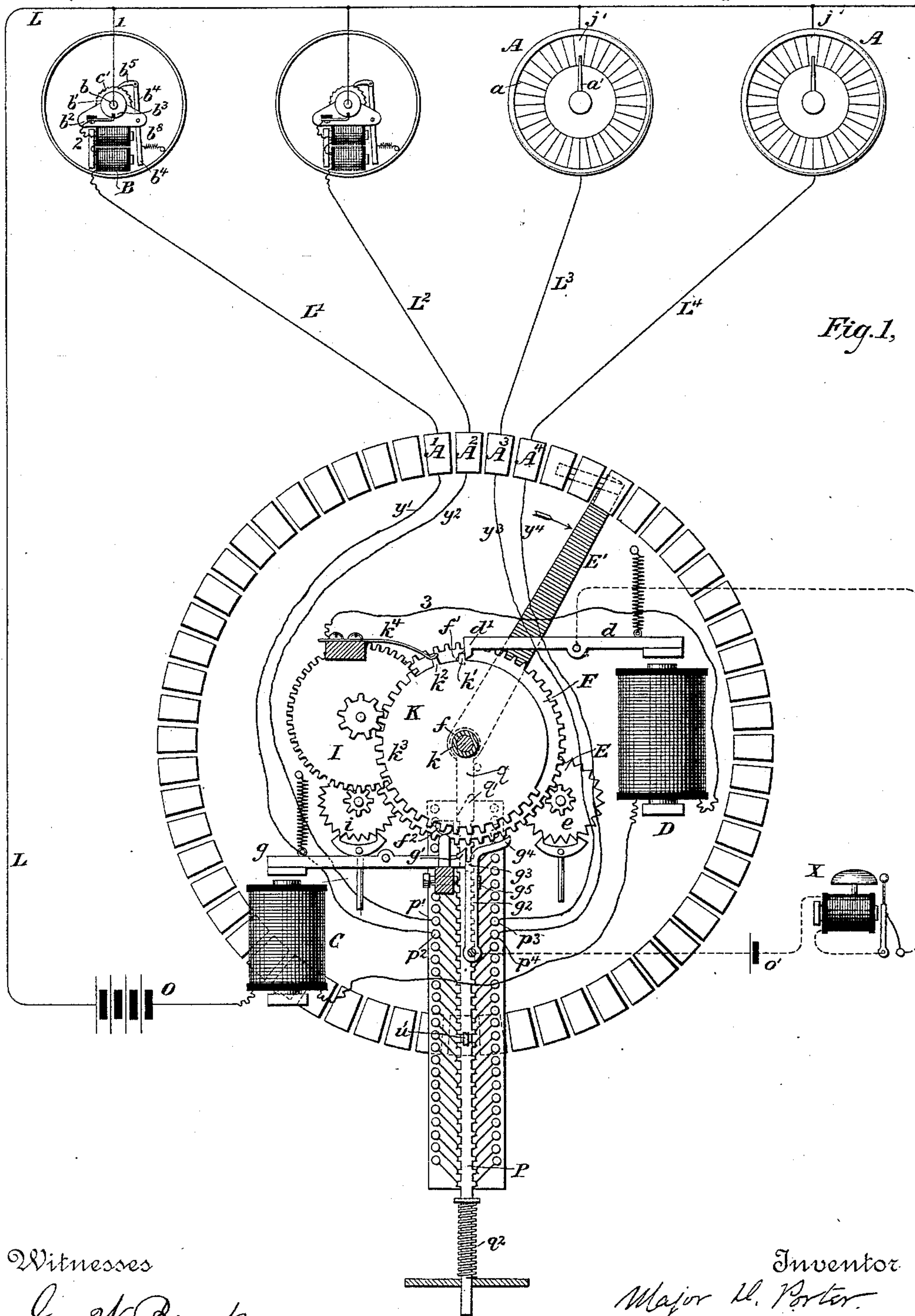


M. D. PORTER.
ELECTRIC INDICATOR.

No. 424,726.

Patented Apr. 1, 1890.



Witnesses

Geo. W. Breck

Sam. E. Ashley

Inventor

Major M. Porter

By his Attorneys

Pepe & Edgcomb.

(No Model.)

5 Sheets—Sheet 2.

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Fig. 2,

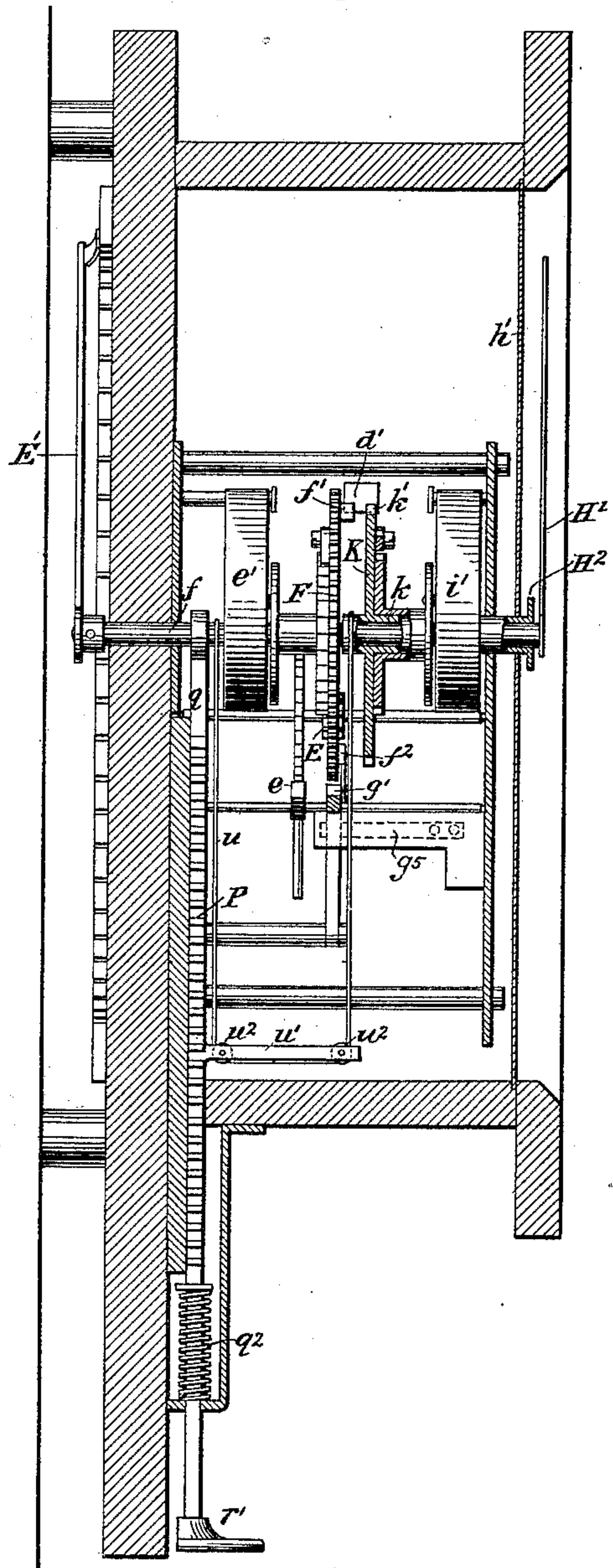


Fig. 3,

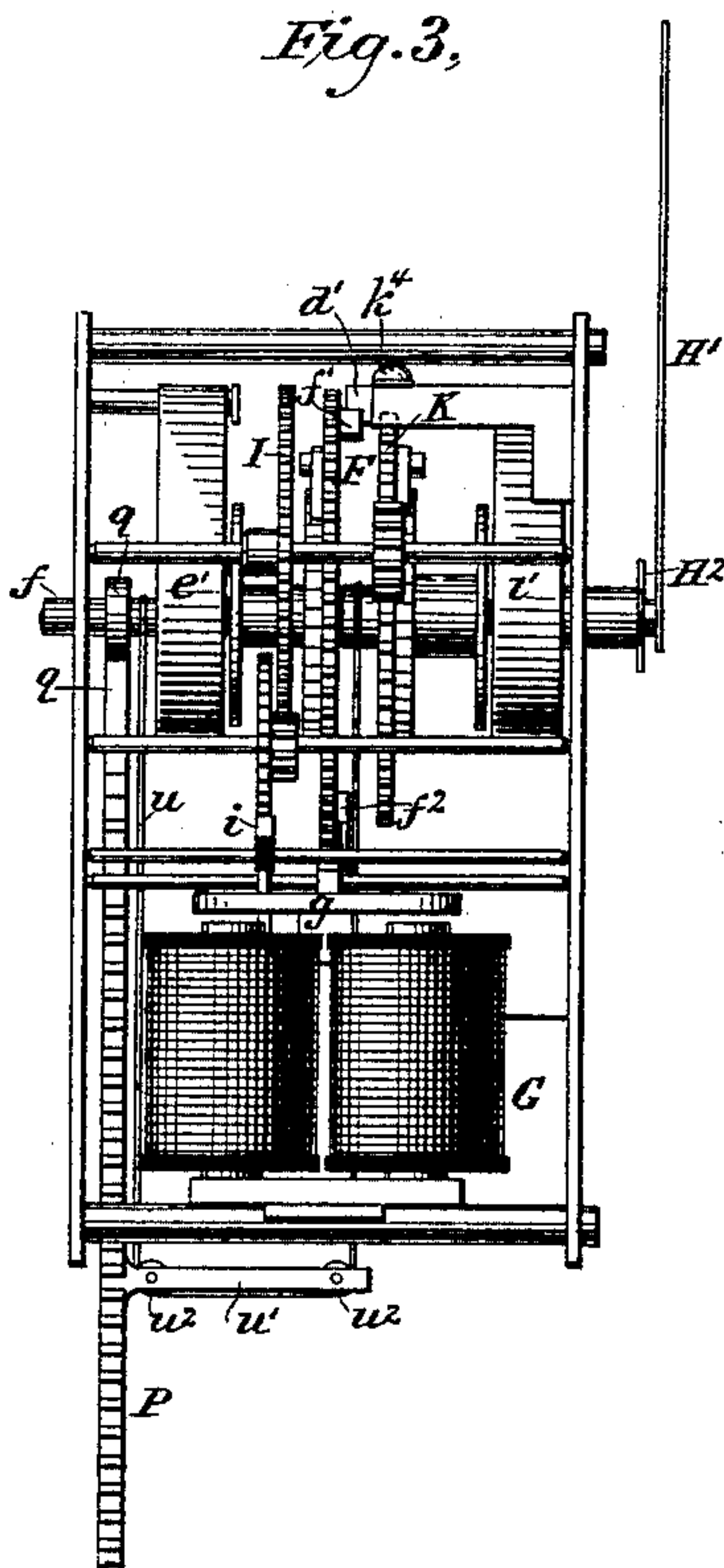
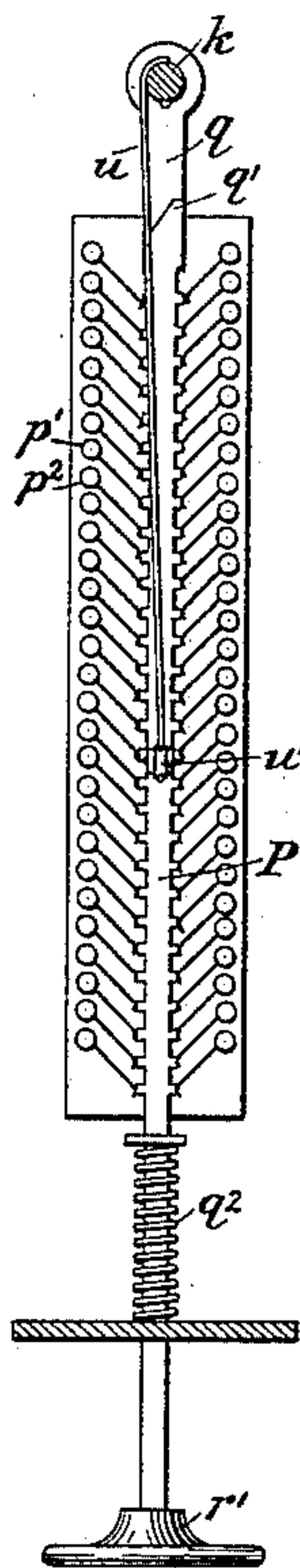


Fig. 4,



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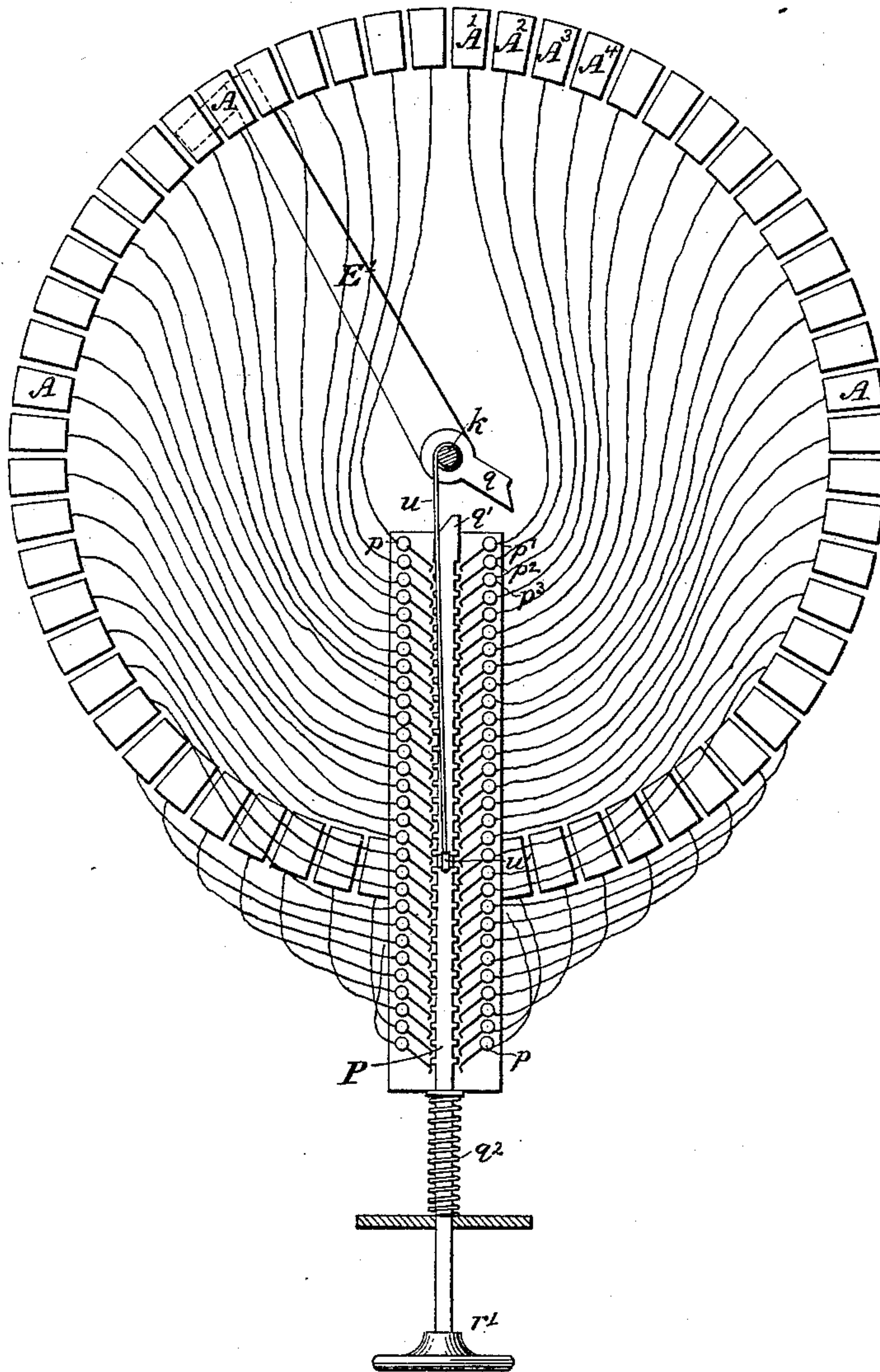
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Fig. 4,^a



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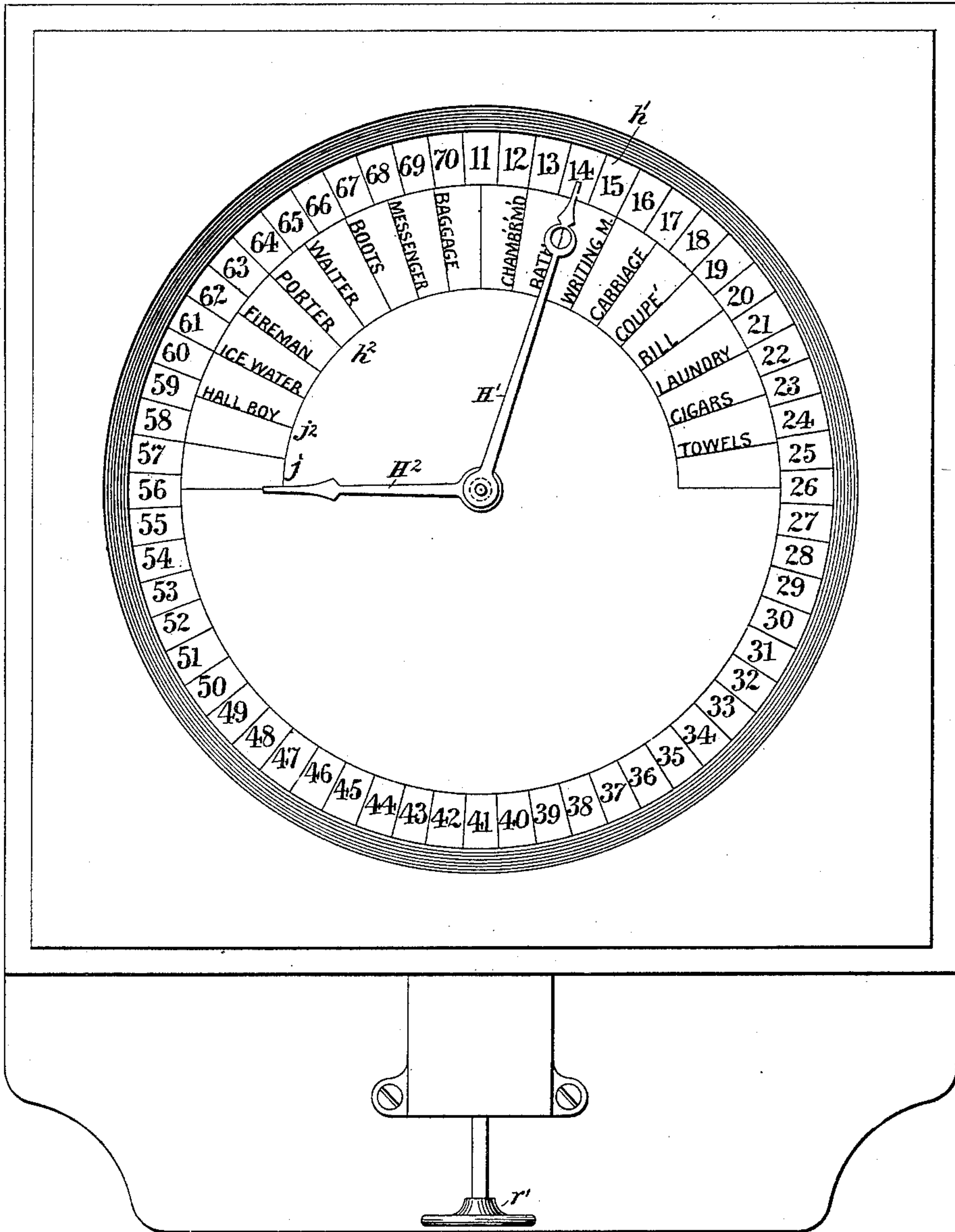
Pope & Cageromb

M. D. PORTER.
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Fig. 5,



Witnesses

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Carrie C. Ashley

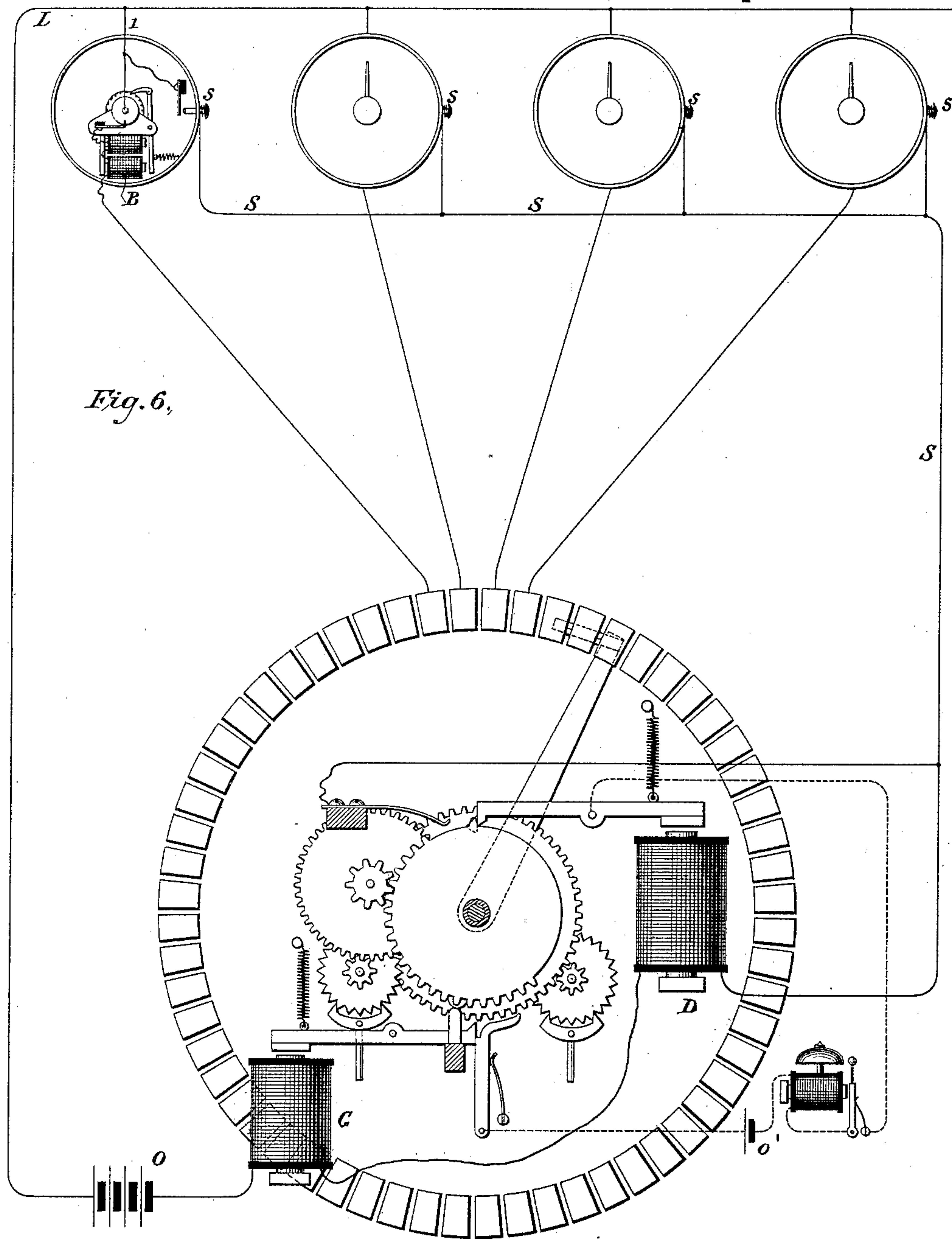
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UNITED STATES PATENT OFFICE.

MAJOR DANE PORTER, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE
PORTER ELECTRIC MESSENGER COMPANY, OF NEW YORK.

ELECTRIC INDICATOR.

SPECIFICATION forming part of Letters Patent No. 424,726, dated April 1, 1890.

Application filed October 17, 1885. Serial No. 180,127. (No model.)

To all whom it may concern:

Be it known that I, MAJOR DANE PORTER, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Indicators, of which the following is a specification.

My invention relates to an organization of apparatus adapted to be employed for automatically indicating at a central station the wants of persons located at different points connected therewith by electric conductors.

The general object of the invention is to provide more simple and efficient means than have heretofore been devised for causing the indications to be automatically transmitted from the different points one at a time, and to insure that there shall be no interference of signals during the transmission.

The invention consists in organizing the apparatus in substantially the following manner: At each station—at the rooms of a hotel, for instance—there is located a transmitter, which is capable of being placed in position to indicate any of a series of wants such as may require attention from the hotel office. At the office there is located a device adapted to be operated to indicate the rooms in which the respective transmitters are located and also the wants which those indicators are designed to transmit. The operation of setting the transmitter serves to close a circuit through an electro-magnet at the hotel office, which, when vitalized, releases a circuit-closer. This circuit-closer is thereupon advanced by a suitable motor, and continues to move over a series of contact-plates which are respectively connected with the conductors leading from the different rooms until it arrives at the particular plate connected with the room at which the circuit was closed, whereupon it is automatically arrested. When in this position, the circuit is made and broken by the action of the apparatus at the office and the transmitting device is returned step by step to its position of rest, at which point it automatically interrupts the circuit. The impulses thus occasioned advance an indicating-arm in the receiver and drive it forward as many steps as were required to return the indicator of the transmitter from the position

in which it had been set to its starting-point.

A dial is provided for the receiving-indicator corresponding to that of the transmitter, and thus the indicator of the receiver will be brought into position to show the want at which the transmitter was set.

Suitable means are provided for giving an alarm or call to attract the attention of the attendant at the office when the apparatus operates, and by means of a suitable pull or push button the circuit-closing arm and the want-indicator are returned to their starting-point, and the apparatus is thus in readiness to again operate.

Referring to the drawings, Figure 1 is a front elevation, partly in section, illustrating the general organization of the apparatus, showing in diagram the circuit-connections. Fig. 2 is a transverse section, and Fig. 3 is a side view, of the receiving apparatus; and Figs. 4 and 4^a illustrate certain details in the organization of the same. Fig. 5 is a front elevation of the receiving-dials. Fig. 6 illustrates a modification.

Referring to the figures, A represents the dial of the transmitting device, upon the face of which there are divisions *a*, designating various classes of wants—such as may occur at the rooms of hotels, for instance. An indicating-arm *a'* is designed to be turned in either direction until it points to the particular division which designates the want for which a call is to be sent. The indicator *a'* is carried upon a shaft *b*. A disk *b'* is secured rigidly to this shaft, and this is in electrical connection by means of a conductor 1 with a line *L*, leading to the office or to the earth. A conductor 2, connected with a conductor *L'*, which leads from the office, is connected, through the coils of an electro-magnet B, with a contact-spring *b*². In the disk *b'* there is placed an insulated contact-surface *b*³. When the transmitter is at rest, the spring *b*² bears upon the point *b*³, and therefore the connections between the conductors *L* and *L'* are interrupted. When, however, the indicator *a'* is turned, the connections through the magnet B are established. It is designed that the disk *b'* shall be returned step by step to its starting-point by means of a pawl *b*⁵, carried by the armature *b*⁴, which is applied to

the electro-magnet B. The pawl acts upon a ratchet-wheel c' , carried upon the shaft b when it is driven forward by the action of a spring b^8 . It is evident that the arm a' and the shaft b may be turned toward the left hand, carrying with them the wheel c' .

When the circuit has been completed by setting the transmitting device, an electro-magnet D in the receiver, which is included in the circuit of all the conductors $L' L^2 L^3$, &c., leading from the respective rooms, becomes vitalized and operates to release a circuit-closing arm E' . This arm when so released is driven over a series of contact-plates $A' A^2 A^3$, &c., in the direction indicated by the arrow by a spring e' or by any other suitable motor. Such release is preferably accomplished in the following manner: Upon a shaft f , which carries the arm E' , there is carried a toothed wheel F, which is driven by the spring e' . The train of gear E meshes with a retarding-escapement e . A stop f' , placed upon the face of the wheel F, is normally engaged by a detent d' upon the armature-lever d of the electro-magnet D. When the electro-magnet is vitalized, this detent is removed from the path of the stop and the wheel is allowed to advance. The moment the wheel F commences to move the normal circuit-connections will be interrupted, in a manner to be described, and immediately afterward become complete through the particular contact-plate A' , A^2 , or A^3 , &c., connected with the actuated transmitter, in a manner to be described. The lever d is therefore immediately released, but the stop f' will have passed the detent, and the wheel F will therefore continue to advance until the arm E' arrives at that plate, whereupon it will be arrested by a pawl g' , entering the teeth of the wheel. This pawl is carried upon the lever g of an electro-magnet G and enters the teeth when the electro-magnet is vitalized. This magnet is included in the same circuit with the magnet D. It is, however, prevented from so locking the wheel when the releasing-impulse is sent, for a lug f^2 upon the wheel F stands at that moment in the path of the lever; but the advancement of the wheel carries this lug out of the path of the lever. When, however, the locking-pawl g' has been thus thrown into engagement with the wheel, it is locked in its forward position by a lever g^2 , insulated from the frame, a shoulder g^3 passing behind the end of the lever. A spring g^5 tends to throw the lever g^2 forward. An extension g^4 upon the lever g^2 strikes into the path of the teeth of the wheel F and the first backward movement of the wheel, when it is desired to return the same to its starting position, serves to throw this lever g^2 back, and thus to release the locking-lever g' . It is evident that this release may be accomplished in various other ways.

An indicating-arm H' is mounted upon the shaft f , and this serves to point out the number of the room containing the calling-trans-

mitter by passing over a dial-plate h' , upon which are characters designating the different rooms.

The same movement of the lever d which releases the wheel F also releases a circuit-controlling wheel K, which is carried upon a sleeve or quill k , surrounding the shaft f . This quill carries a want-indicator H^2 , which is adapted to move over a dial-plate h^2 , upon which the wants are designated in a sequence corresponding to the designations upon the transmitters. The quill is driven by a train of gear I, provided with an escapement i , similar to the corresponding device e . The wheel K is normally held at rest by the detent d' upon the armature-lever d , engaging a tooth or stop k' upon the wheel K. The movement of the lever d , which releases the wheel F, raises this detent from the path of the tooth k' and allows the wheel K to advance a slight distance. It is, however, immediately arrested by the release of the armature-lever, which permits the detent to fall in front of a second tooth k^2 . The wheel K therefore then remains locked until the wheel F is arrested by the contact of the circuit-closing arm with the contact-plate to which the circuit is closed from the room. It then remains to cause the transmitter and the wheel K to combine in transmitting a sufficient number of impulses to allow the arm H^2 to come to the want designation upon the dial h^2 , corresponding to that at which the transmitter was first set. The wheel K is provided with a series of teeth k^3 , in number equal to the number of wants to be indicated or the number of contact teeth or points upon each transmitter-wheel. A contact brush or spring k^4 rests against these teeth and makes contact with them in succession as they pass beneath it. The wheel K is in electrical connection with the contact-arm, and when the latter is arrested in contact with any plate $A' A^2$, &c., that plate will be connected, through the teeth of the wheel, with the brush or spring k^4 . The brush k^4 is connected by a conductor 3, including the magnets D and G, with one pole of a battery O, the other pole of which is connected either with the earth or with the return-conductor L for all the rooms. When the wheel K is moved, the teeth k^3 pass beneath the spring, and the spaces between them serve to interrupt the circuit-connections, and thus demagnetize both the magnets B and D. The wheel K is thus released by the vitalization of this magnet D and commences to advance. Immediately upon the movement of the wheel K a space between the teeth comes beneath the contact-spring k^4 , and the circuit is interrupted. The armature-lever thereupon falls away and the detent d' engages the succeeding tooth. A second tooth, however, immediately comes into contact with the spring and the circuit is again completed. In this manner the connections through the electro-magnet D will be successively made and interrupted and the armature d will oc-

occasion a step-by-step movement of the wheel K, and thus of the want-indicating arm. Each interruption of the circuit will also cause a corresponding movement of the armature b^4 of the transmitter-magnet B, and thus return the indicator a' to its starting-point. The movements of the indicator a' will thus correspond to those of the want-indicator H^2 of the receiver, and for each space of the dial passed over by the former a corresponding division of the dial h^2 of the receiving-annunciator will be passed by the indicator H^2 . The spaces upon the dial h^2 are so placed that, starting from one extremity j , the different wants are indicated in the same order as are represented upon the transmitting-dial, commencing at the point j' and reading toward the right hand. If therefore the transmitter-indicator a' be placed upon the third division, for instance, then when it is returned three movements of the receiving-indicator H^2 will be occasioned after the room has been indicated, and this will cause the latter to stand at the third division and indicate the want represented thereon.

The operation of bringing the indicator into position to designate the want also serves in this manner to restore the transmitter-indicator to its normal position of rest. When the indicator a' reaches its normal position, the circuit through the conductor L is interrupted, and therefore the electro-magnet D will not be again vitalized and the indicator H^2 will stand at the want desired.

It is designed that the springs e' and i' , which actuate the trains E and I, shall be wound by the operation of returning the indicators H' and H^2 to their normal positions. The devices employed for returning the indicators to their starting-points are combined with the circuit-interrupting device P, which will now be described.

Upon the arbor f of the wheel F and upon the sleeve or quill k of the wheel K there is fastened a cord u , connected with an arm P. The cord is fastened at one end to the arbor, and, passing over pulleys u^2 in an arm u' , is attached at the other end to the sleeve k . The forward movement of the respective wheels causes the cord to be wound upon the respective arbor and sleeve. When, however, the bar P is drawn down by its handle r' , the cord is unwound and the wheels F and K, together with their respective indicating-arms, are returned to their normal positions and their actuating-springs are wound preparatory to the receiving of another signal. The indicators are locked in position and prevented from advancing until the succeeding call has been received in the manner described.

The several conductors leading from the different rooms are connected with contact-plates A' A^2 A^3 , &c., as already described, and these plates are respectively connected by conductors L' L^2 L^3 , &c., with points p' p^2 p^3 , &c., arranged in a series. A movable contact-bar P is normally held in position to

make contact with all these points, and to thereby complete the circuit-connections from each of the conductors through the points to the bar itself and through the bar to an arm q , which is secured to the arbor f of the wheel F. The arm q is thus in electrical connection, through the arbor of the wheel F, with the wheel K, and when the apparatus is at rest the brush k^4 rests upon the tooth k^2 . In this manner all the lines are connected, through the bar P, with the brush k^4 , and thus with the battery. Normally the rod P is held in the position shown in the drawings by the engagement of a lug q' upon it with the arm q against the tension of the spring q^2 , which tends to throw it upward. (See Fig. 4^a.) The moment the wheel F commences to move the shaft k commences to revolve, and with it the arm q . The latter immediately passes out of the path of the lug q' upon the bar P, and the spring immediately throws the bar upward, so that not only are the circuit-connections interrupted between the bar and the arm q by the movement of the latter, but also the connections between the bar and each of the contact-points p' p^2 p^3 , &c., are interrupted by the upward movement of the bar. The circuit-closing arm, however, will continue to move, as already described, until it reaches the contact-plate connected with the transmitter, which has been set.

It will be understood that by thus connecting each conductor with a contact-plate and causing signals to be received through a contact-arm capable of being placed against only one of such plates at a time there can be no interference of signals; and if two call-boxes be set at one time one will not be operated to give its signal until the other has been actuated and the receiver has been returned to its position of rest.

The invention has been particularly described in connection with a hotel-annunciator system; but it will be readily understood that it is applicable to district-telegraph systems, telephone systems, and to various other electrical systems, and I do not wish to confine myself to its application to hotel-annunciators.

In Fig. 6 I have shown an organization of apparatus wherein by means of a second circuit the series of contacts p' p^2 p^3 , &c., described with reference to the former figures, may be dispensed with and the device released by a current transmitted over an independent circuit by the person desiring to send a call. According to this organization, a conductor S leads through all the rooms to the electro-magnets D and G and is connected with one pole of the battery O, the other pole of which is connected either with the earth or by the return-conductor L to the rooms. The conductors L' L^2 , &c., lead to the contact-plates directly, and the contact arm or brush k^4 is connected when the want-indicator is actuated through the electro-magnets D and G, as

before. The transmitters are respectively provided with push-buttons S, whereby the connections may be established between the conductor S and the return-conductor L, or the earth, as the case may be, thereby causing the releasing-magnet D to be vitalized. The circuit will immediately be opened again by releasing the push-button, and the contact-arm E' will continue to be advanced until it has reached the particular plate connected with the conductors L' L² L³, &c., leading to the room containing the calling-transmitter. The general operation of the apparatus will be essentially the same as that already described.

For the purpose of causing an audible signal to be given when a want is indicated, one pole of a local battery O' may be connected with the lever g², while the other pole is connected, through a signal-bell X of any suitable construction, with the lever d. When therefore the wheel F has been advanced and locked, the circuit will be complete through the lever g², wheel F, and lever d, and the signal device X, and thus a signal will be given until the apparatus is returned to its normal position.

Features shown and described in this case, but not claimed, are claimed in my earlier application, filed August 10, 1885, and serially numbered 173,901.

I claim as my invention—

1. The combination, with a series of variable signal-transmitters, each having an indicator, a circuit-controller, and a magnet, of a receiver having a transmitter-indicator, an automatically-started signal-indicator, and a rheotome, and an electric circuit between the transmitter and receiver, including the magnets of the former and the rheotome of the latter, the interruptions of the circuit by the rheotome causing the magnets of the transmitters to restore the indicators thereof and break the said circuit, substantially as set forth.

2. The combination, with a series of variable signal-transmitters, each having an indicator, a magnet, and a circuit-controller, of a special wire leading from each transmitter to a receiver, a make-and-break mechanism located in such wires and adapted to simultaneously complete or interrupt circuit-connections through all of them, a circuit-closer adapted to successively make contact with terminals of such wires, a detent for normally holding the said circuit-closer, a magnet operating such detent to release the said circuit-closer, a transmitter-indicator operating with the said circuit-closer, a signal-indicator, and a rheotome for interrupting the circuit between the transmitters and receiver and restoring the former to positions of rest and breaking the circuit, substantially as set forth.

3. The combination, with a series of variable signal-transmitters, of a series of terminals respectively connected by special wires to the said transmitters, a circuit-closer normally at rest located in a normally-open circuit and

when in motion successively making contact with the said terminals, which are located in its path, a transmitter-indicator for locating the respective transmitters, a signal-indicator for reproducing the transmitter-signals, a motor, and stopping and starting mechanism, including a locking-wheel and a detent controlled by the circuit between the transmitters and the said terminals and combined with the said indicators to stop the transmitter-indicator and start the signal-indicator when the circuit through any terminal has been closed, substantially as set forth.

4. The combination, with a series of variable signal-transmitters, of a series of terminals respectively connected therewith, a circuit-closer normally at rest and when in motion successively making contact with the said terminals, which are located in its path, a detent for normally restraining the circuit-closer, a magnet for operating the detent to release the circuit-closer and controlled by the circuit between the transmitters and terminals, and a signal-indicator, also controlled by the said circuit, substantially as set forth.

5. The combination, with a series of variable signal-transmitters, of a series of contact-plates respectively connected therewith, a circuit-closer arm normally at rest, adapted to successively make contact with the said plates, a locking wheel or segment moving with the said arm, a detent for normally locking the said wheel, an electro-magnet for retiring the detent when any transmitter is set, an electro-magnet, the armature thereof and an armature-lever for locking the arm in any of its positions, means for vitalizing the last-named electro-magnet when the said arm has reached the contact-plate connected with a calling-transmitter, and a signal-indicator actuated in harmony with the movements of a transmitter, substantially as set forth.

6. The combination, with a series of variable signal-transmitters, each containing a magnet, an indicator, and a circuit-controller, of a series of terminals respectively connected therewith, a circuit-closer normally at rest, adapted when in motion to successively make contact with such terminals, a motor for actuating such circuit-closer, a circuit the connections whereof are completed through any transmitter which is set and the circuit-closer when the latter strikes the terminal of the said transmitter, a rheotome, and a signal-indicating arm advanced step by step under the control of the said rheotome, the interruptions whereof operate the magnet of the transmitter to restore the indicator thereof to its normal or zero position, substantially as set forth.

7. The combination, with a series of variable signal-transmitters, circuit-connections normally interrupted by the said transmitters, but closed by setting the same, a series of contact plates or terminals located at a receiving-station, a circuit-closer normally at rest, but when in motion successively making contact with the said plates, which are located

in its path, a motor released by the closing of a circuit in a transmitter for driving the circuit-closer, a magnet to immediately interrupt the circuit closed by the contact of the circuit-closer with the plate of a transmitter which has been set, and a signal-indicator actuated under the control of the circuit between the transmitters and the receiving-station, substantially as set forth.

8. The combination, with a battery, of a series of variable signal-transmitters located at sub-stations and each adapted to complete the battery-circuit, an electro-magnet included in the circuit so completed and located at a main station, an indicating-arm located at the said main station and normally at rest, but caused to advance when the said electro-magnet is vitalized, a dial over which the said arm moves, a stop for arresting the said arm to indicate upon the dial the particular sub-station at which the circuit was closed, a rheotome, also located at the main station, a signal-indicating arm operated under the control of the rheotome, and a stop for arresting the arm in any of a series of different positions, substantially as set forth.

9. The combination, with a series of variable signal-transmitters, of a series of contact-plates located at a receiving-station and respectively connected with the said transmitters, a circuit-closing arm which is normally at rest, an indicating-arm operating in unison therewith, a detent for normally locking the circuit-closing arm, a magnet to operate the detent and release the arm and vitalized when a circuit is closed at any one of the transmitters, a stop for arresting the arm in contact with the plate corresponding to the transmitter in which the circuit has been closed, a magnet for controlling the said stop, a signal-indicator, and a rheotome for advancing the same step by step under the control of the transmitter calling, after the circuit-closing arm has been arrested, substantially as set forth.

10. The combination, with a series of contact-plates, of a rotating contact-arm, a series of contact-points respectively connected with the plates, a movable circuit-interrupting rod normally held in contact with the said points, and a mechanical cut-out coupled with the arm and moving the rod out of contact with the points, substantially as set forth.

11. The combination, with a battery, of a series of variable signal-transmitters, each adapted to close the battery-circuit, a series of plates respectively connected with the

transmitters by special wires and located at a receiving-station, make-and-break mechanism located in the said special wires for making and breaking the circuits through all of them simultaneously, a shaft, a circuit-closing arm mounted on such shaft and normally at rest, an electro-magnet for releasing the arm when the circuit of the battery is completed, connection between the shaft and the make-and-break mechanism, whereby the same is operated to break all of the special transmitter-circuits when the shaft and hence the arm starts, a lock to arrest the arm in contact with the plate of the transmitter in which the circuit has been completed, an index on the said shaft to show the station calling, a signal-indicator, and a rheotome released when the arm is stopped, controlling the operation of the signal-indicator in showing the signal to which the transmitter has been set, substantially as set forth.

12. In an electric indicator, the combination, with a series of signal-transmitters, of a corresponding series of terminals located at a receiving-station, and a movable circuit-closer to successively engage with the said terminals, an indicator for locating the transmitters, and a locking-wheel for locking the indicator in any of its positions and rigidly connected with the circuit-closer, whereby the integrity of their relations is always preserved and reliability of indication secured, substantially as set forth.

13. In an electric indicator, the combination, with a series of variable signal-transmitters, of a corresponding series of terminals located at a receiving-station, a circuit-closer normally at rest, but when in motion successively making contact with the said terminals, which are in its path, a mechanically-actuated train for driving the circuit-closer, a transmitter-indicator connected with the circuit-closer, a signal-indicator, a mechanically-actuated train for actuating the same, an electric circuit between the transmitters and the receiving-station, and means controlled by the said circuit for starting and stopping each of the said trains, which are normally at rest, substantially as described.

In testimony whereof I have hereunto subscribed my name this 16th day of October, A. D. 1885.

MAJOR DANE PORTER.

Witnesses:

CHARLES A. TERRY,
GEO. W. BRECK.