

A. VAN WAGENEN.  
TRANSMITTER.

APPLICATION FILED MAY 4, 1896.

2 SHEETS—SHEET 1.

Fig. 1.

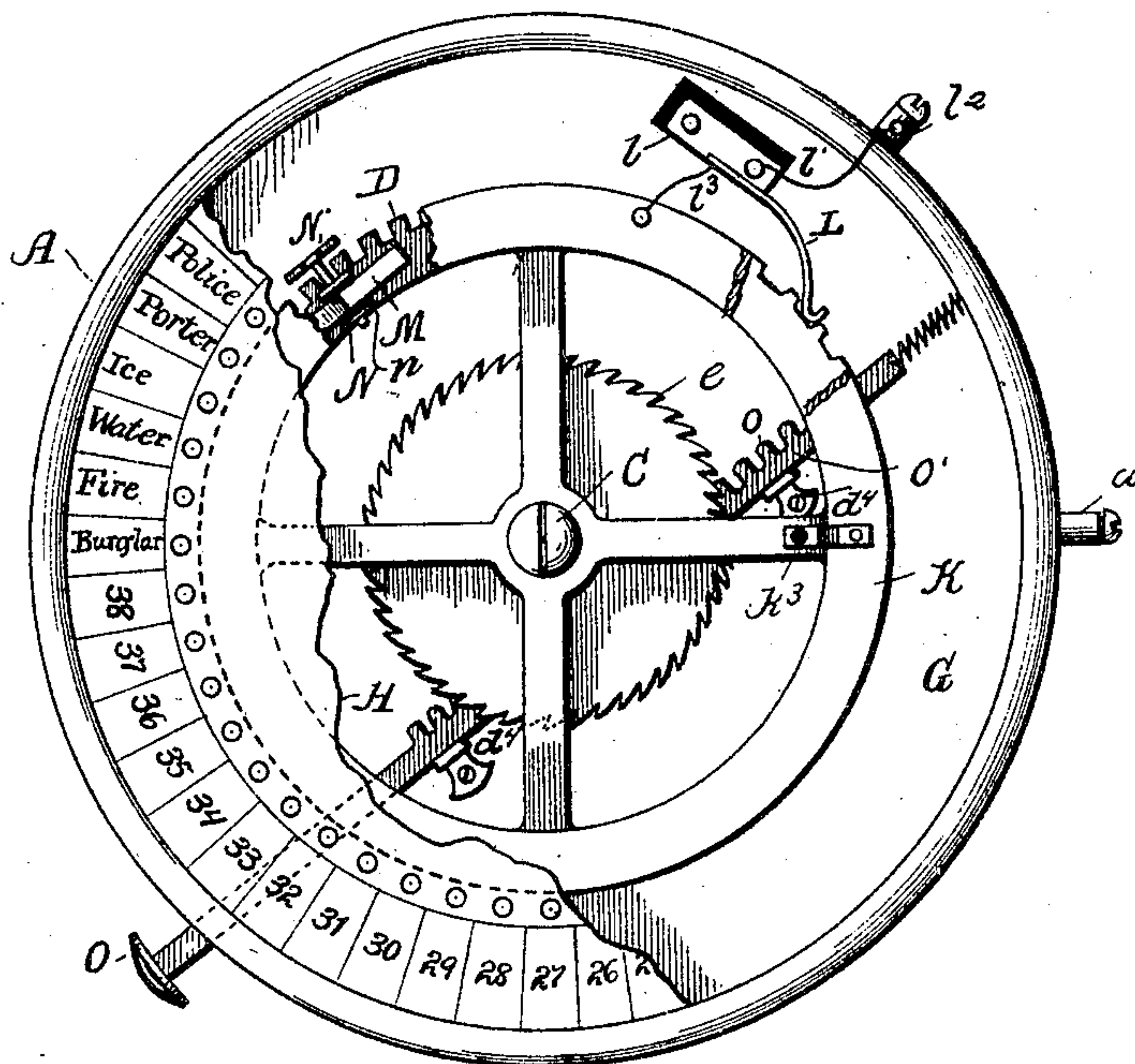


Fig. 2.

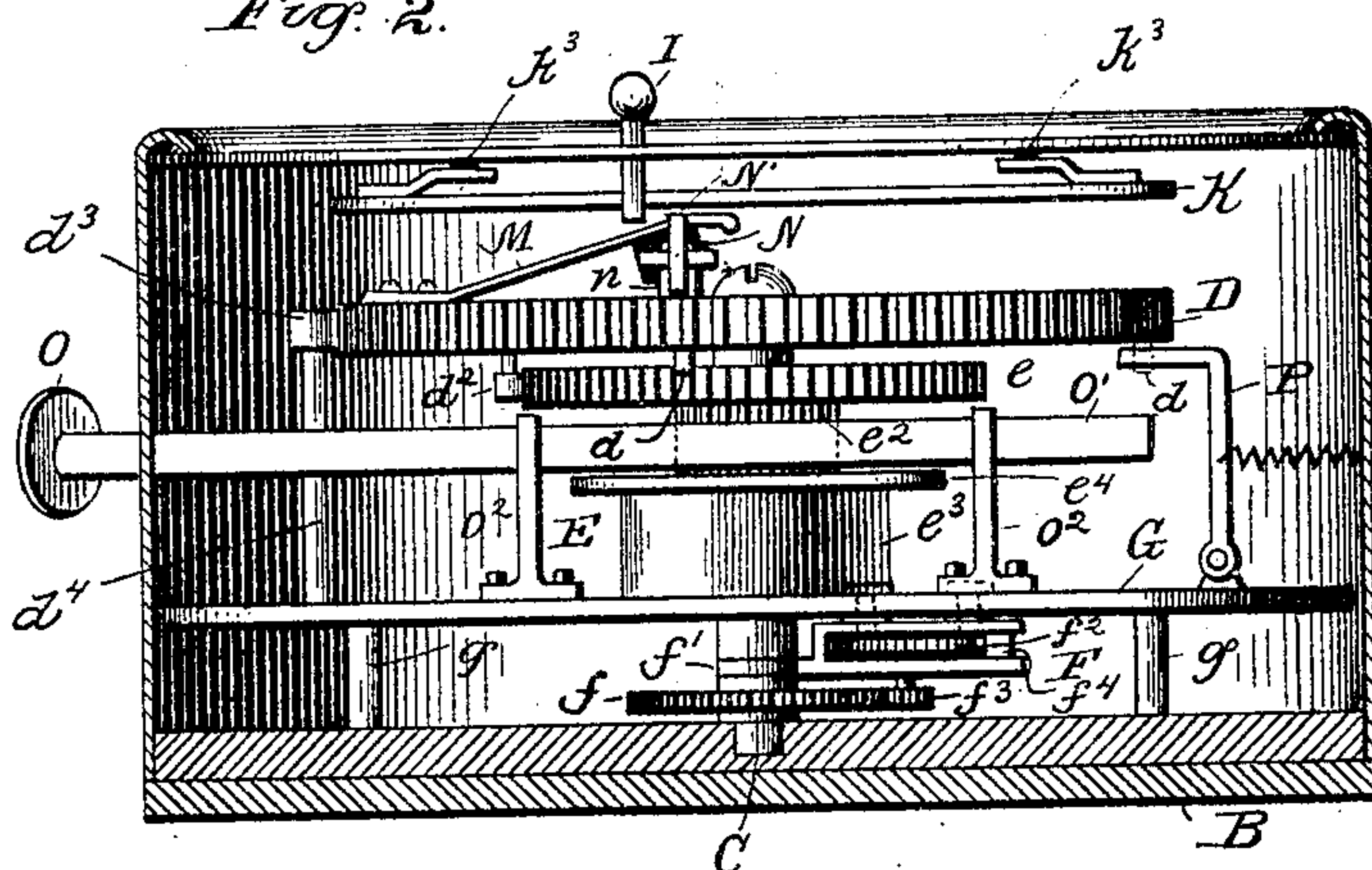
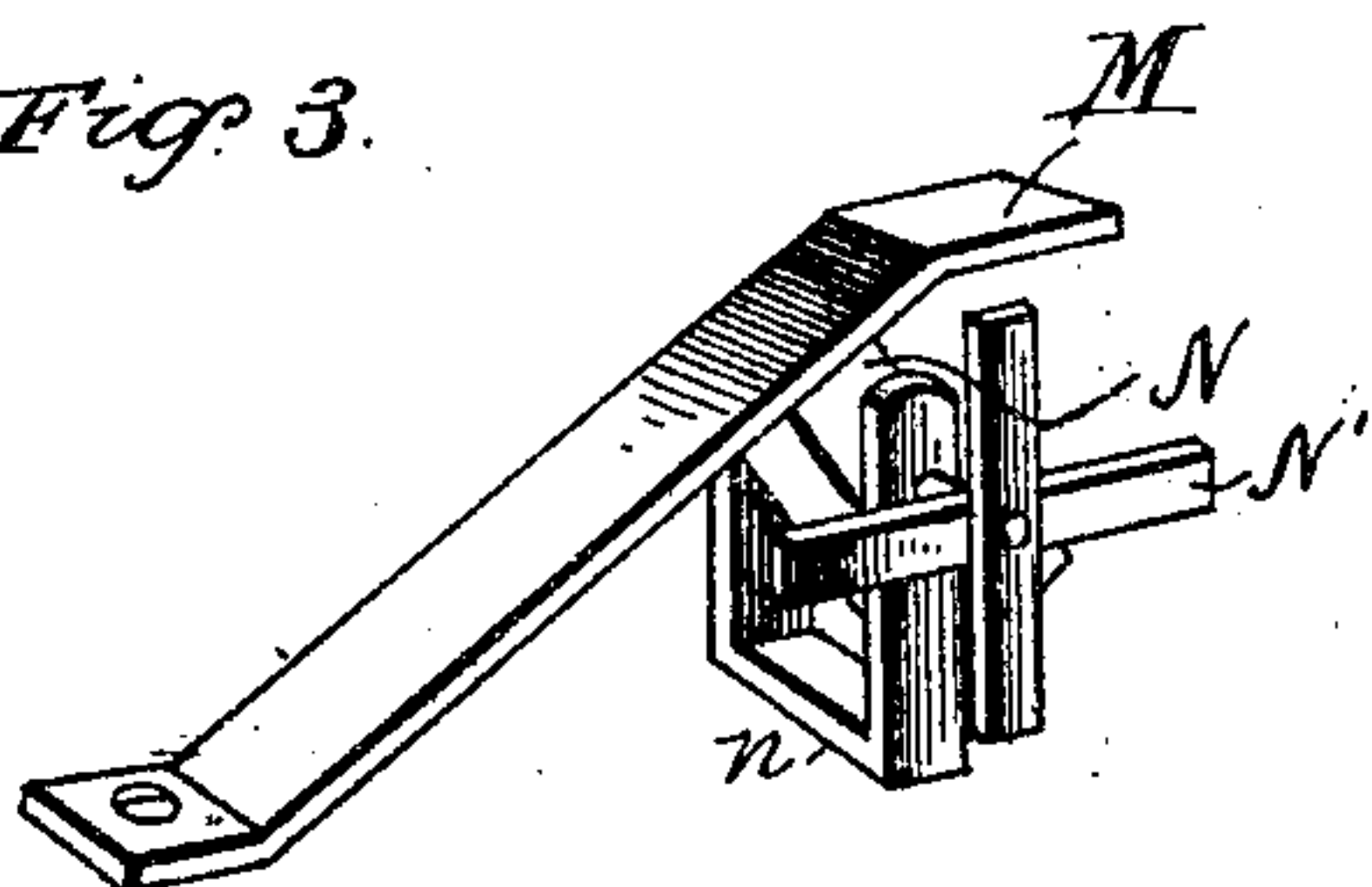


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

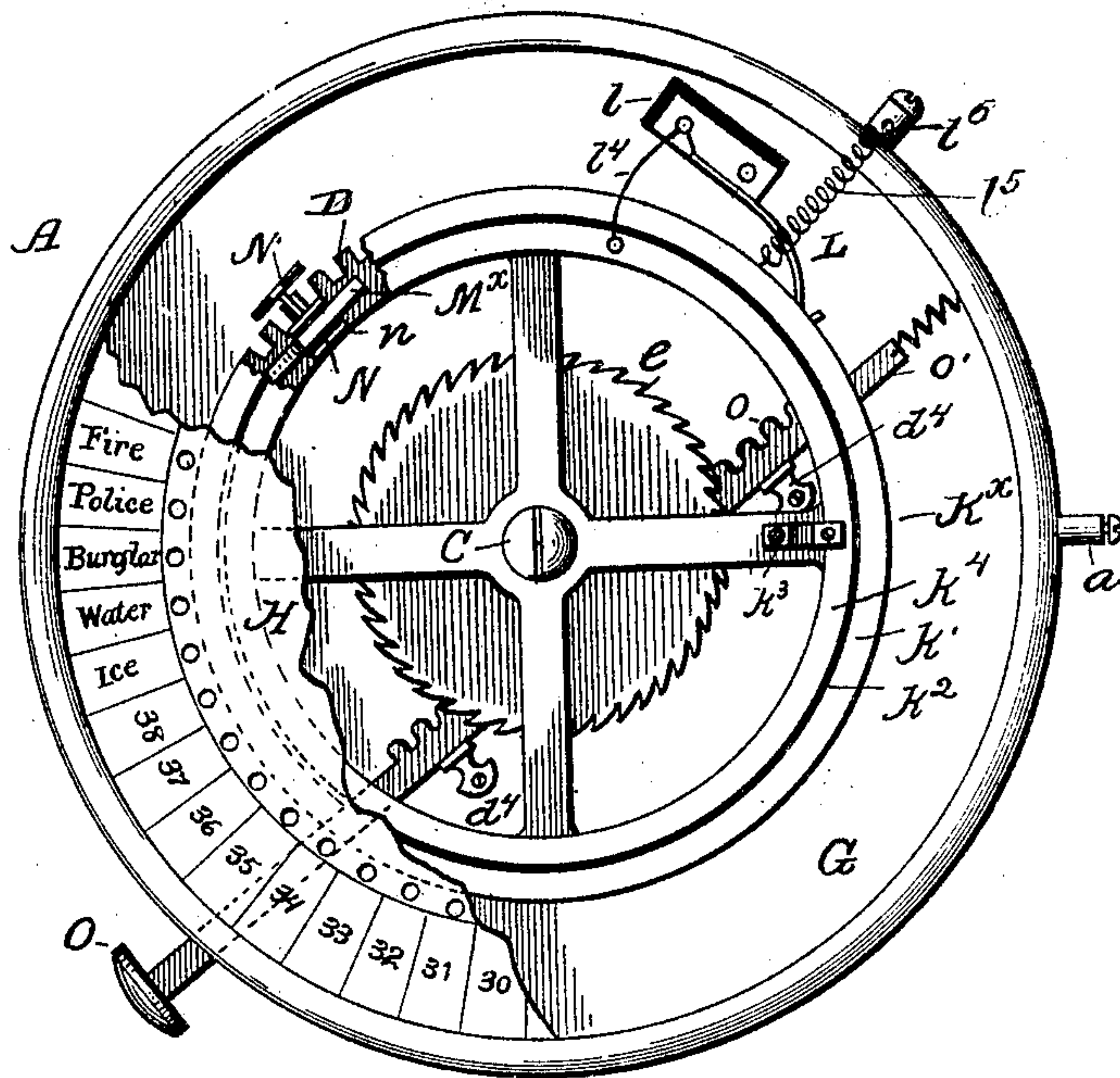
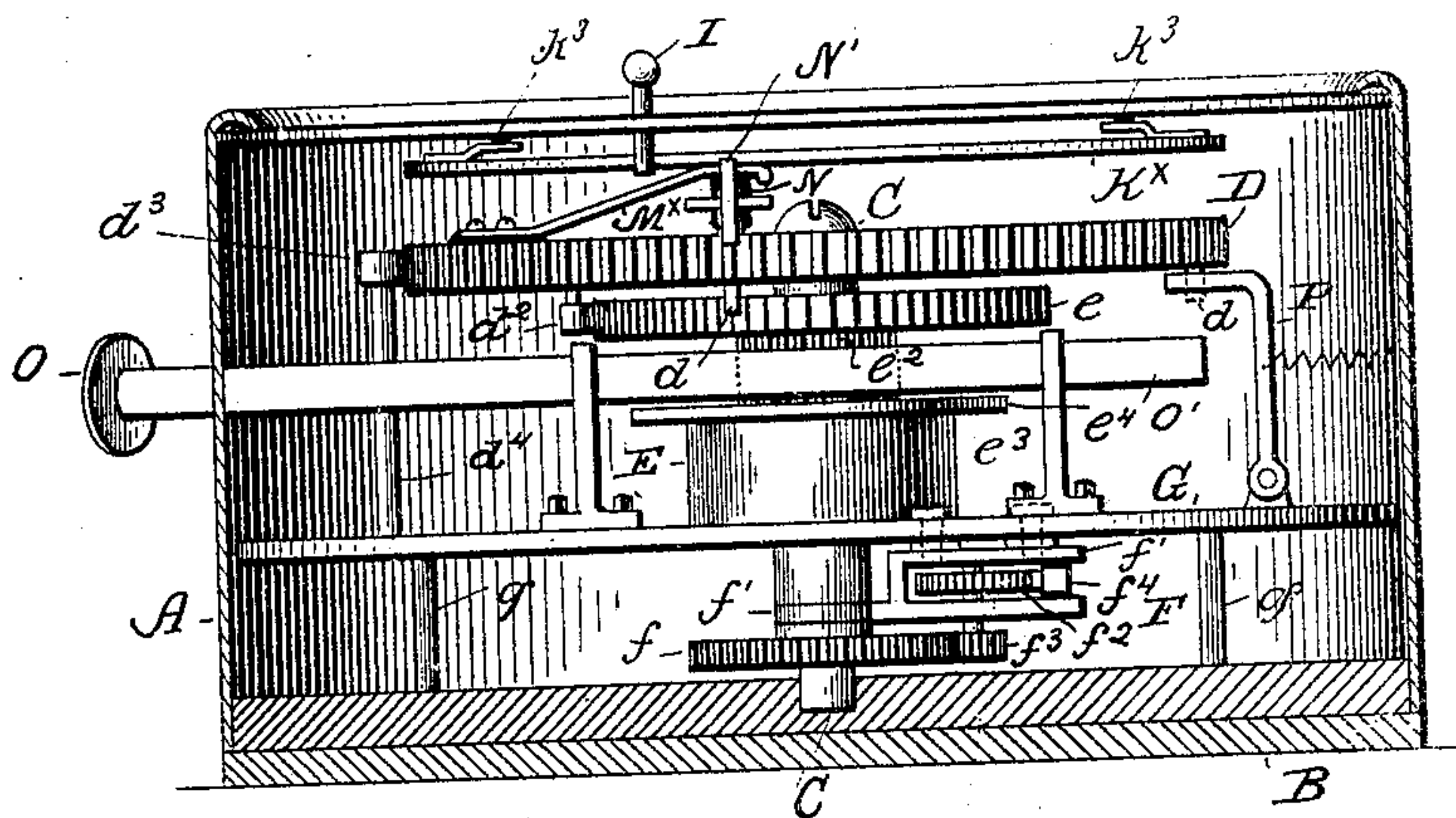


Fig. 5.



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# UNITED STATES PATENT OFFICE.

ANTHONY VAN WAGENEN, OF SIOUX CITY, IOWA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CLARK AUTOMATIC TELEPHONE SWITCH-BOARD COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF WEST VIRGINIA.

## TRANSMITTER.

No. 804,280.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed May 4, 1896. Serial No. 590,205.

*To all whom it may concern:*

Be it known that I, ANTHONY VAN WAGENEN, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Transmitters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-  
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pertains to make and use the same.  
My invention relates to improvements in instruments used in connection with systems of electrical intercommunication, and especially to those used in connection with automatic telephone-exchange systems; and it consists in the improved transmitter, the construction and arrangement of the parts of which will be hereinafter fully described, and particularly pointed out in the claims.

The transmitter which constitutes my present invention belongs to that class of transmitters in which the interruptions in the electrical circuit through the transmitter necessary to bring about any desired movement of the switch of the receiver or other instrument with which the transmitter may be in electrical communication are produced by a circuit making and breaking mechanism having an actuating member which moves continuously forward and never has a return or backward movement.

The object of my invention is to provide a transmitter of this class in which the actuating member of the circuit making and breaking mechanism will move continuously forward at each actuation thereof until it returns in such forward movement to its normal or zero position and in which the number of interruptions in the electrical circuit through the transmitter necessary to bring about any desired connection shall be determined not by the stoppage of the actuating member at a point corresponding to that at which an indicator or other like device has been placed to denote the desired connection, as has heretofore been done, but by such an alteration of the current through the transmitter after it has reached and passed the point at which the indicator is stationed as shall render the further movement of the actuating member without effect, so far as concerns the receiver or other instrument with which the transmitter may be in electrical

communication. In this manner the switch of a receiver or other instrument with which the transmitter may be in electrical communication can be placed in any desired position and caused to establish any desired connection. The return of such switch to its normal or zero position is brought about by again actuating the transmitter, the circuit making and breaking mechanism of which will be inoperative, so far as the switch of the receiver or other instrument is concerned, until its actuating member reaches a position corresponding to that occupied by the switch, at which point it will become operative and will carry such switch around with it until both reach their normal or zero position.

In accomplishing the object of my invention I make use in my present construction of a wheel as the moving element or actuating member of the circuit making and breaking mechanism and employ in connection therewith a circular dial having thereon the names, numbers, or other designations of the connections which it is desired to establish or the signals which it is desired to give through the use of the transmitter, and also a series of apertures corresponding to such names, numbers, or other designations into which indicator-plugs are adapted to be inserted. On the under surface of the dial and directly above the rim of the circuit making and breaking wheel I suspend a plate of conducting material with which a spring, secured to the upper surface of the circuit making and breaking wheel, is adapted to contact or not, in accordance with the position in which such spring is held by a pivotally-mounted block which is upon the upper surface of the circuit making and breaking wheel. The position of the block, and thereby that of the contact-spring, is determined by the action of the indicator upon a spur-wheel which is connected with said block. When the transmitter is in its normal or zero position, the contact-spring is held by the pivotally-mounted block either to be in contact with the rim of conducting material or to be not in contact therewith. When the circuit making and breaking wheel is actuated and is caused to move through its prescribed path and to cause interruptions in the electrical circuit, the spur-wheel which forms a part of the pivotally-mounted block is struck by the indicator-plug when the circuit making and



breaking wheel has revolved through a portion of its travel corresponding to the position occupied by such plug, and thereby the position of the contact-switch relative to the plate is altered, it being either thrown out of contact with such conducting-rim or thrown into contact with the same, in any case altering the condition of the electrical circuit through the transmitter in such a manner as to render the further movement of the circuit making and breaking wheel inoperative so far as concerns its being able to effect any movement of the switch of the receiver or other instrument with which it may be in electrical communication. Any desired connection is thus established. To bring the switch of the receiver or other instrument back to its normal or zero position, it is only necessary to actuate the transmitter a second time, when the circuit making and breaking wheel will be inoperative, so far as causing any movement of the switch of the receiver is concerned, until it reaches a position corresponding to that in which the indicator-plug has been set, when such plug will again turn the pivotally-mounted block and will alter the position of the contact-spring relative to the conducting-plate, so that the circuit making and breaking devices will move the switch of the receiver or other instrument around to its normal or zero position.

My invention is fully illustrated in the drawings which accompany and form a part of this application, in which the same reference-letters refer to the same or corresponding parts, and in which—

Figure 1 is a top plan view of my transmitter, part of the dial being broken away to show the conducting-plate and the interior mechanism. Fig. 2 is a side elevation of the transmitter shown in Fig. 1, the case being broken away. Fig. 3 is a detail perspective view of the contact-spring and the pivotally-mounted block, by the action of which the position of said spring is determined. Fig. 4 is a top plan view of a modified form of transmitter, part of the case being broken away, as in Fig. 1. Fig. 5 is a side elevation of the transmitter shown in Fig. 4, the case being broken away to show the interior mechanism.

Referring to the drawings, and particularly to Figs. 1, 2, and 3, A represents the case of my transmitter. This case in the construction shown is circular in form. It is preferably made of nickel-plated metal in order to give the same a neat and attractive appearance, though other materials may be used, if desired. The case is provided with a bottom plate B, from the center of which extends upward the central shaft C. Upon the central shaft are mounted the circuit making and breaking wheel D and the power mechanism E. An escapement mechanism F is located beneath the inner circular plate G, which is supported by pillars g from the base-plate B.

The top of the case is closed by the dial H, on which are formed in circular series the names, numbers, or other designations of the connections which it is desired to establish through the use of the transmitter. The dial-plate is also formed with a series of apertures corresponding in number to the number of names, numbers, or other designations which are formed on the surface of the dial, into which apertures plugs I are adapted to be inserted and to indicate the connection which is desired. On the under surface of the dial H is supported a plate K, of conducting material, preferably of brass. This plate is insulated from the case, because the studs  $h^3$ , which connect the same directly with the dial, are of insulating material. It is suspended directly over the outer rim of the circuit making and breaking wheel D and lies just within the circle of apertures formed in the dial-plate.

The circuit making and breaking wheel D is keyed to the central shaft C and is formed with a series of teeth, cogs, or projections upon its periphery corresponding in number to the number of names or other designations upon the surface of the dial or the maximum number of subscribers in the system. With the periphery of the circuit making and breaking wheel engages the contact-spring L, which is mounted upon an insulated base  $l$  and is connected by the wire  $l'$  with the binding-post  $l^2$ , insulated from the case, by means of which it may be placed in one branch of an electrical circuit. The circuit making and breaking wheel D itself forms the other branch of the circuit, as it is not insulated from the case A, and the case A is provided with a binding-post  $a$ , by which any desired connection may be made. It will thus be seen that every time a tooth on the circuit making and breaking wheel passes the contact-spring L the circuit will be broken and made, and thus the switch of the receiver or other instrument with which the transmitter may be in electrical communication will be caused to move to a position corresponding to that occupied by the circuit making and breaking wheel.

Upon the upper surface of the rim of the circuit making and breaking wheel D is secured a spring M. This spring, in the construction shown in Figs. 1, 2, and 3, rests upon the pivotally-mounted block N and is normally not in contact with the rim K of conducting material. The pivotally-mounted block N is oblong in shape, its length being greater than its thickness, and is adapted when turned in upright position or through a quarter of a revolution to raise the contact-spring M sufficiently to cause the same to contact with the plate K. The block N is supported, as shown, by the frame  $n$ . The pivot which supports the block N extends at one end outside of the frame  $n$  and has keyed thereto a spur-wheel  $N'$ , which in the construction



shown has four arms. This spur-wheel lies in the circle of the apertures formed in the dial-plate and is adapted to come in contact with the indicator-plug I during the course of the revolution of the circuit making and breaking wheel and to be turned through a quarter of a revolution, thus either raising the contact-spring M into contact with the plate K or lowering such contact-spring out of contact therewith in accordance with the previous position of such block. The plate K is connected by the leading wire  $l^3$  with the contact-spring L, so that whenever the spring M contacts with the plate K the circuit through the transmitter is short-circuited, and the further movement of the circuit making and breaking wheel has no effect in causing further actuation of the switch of the receiver or other instrument with which the transmitter may be in electrical communication.

In my present construction the circuit making and breaking wheel is adapted to make a complete revolution at each actuation thereof and to return to its normal or zero position without any interruption or stoppage in its movement.

The mechanism for actuating the circuit making and breaking wheel is as follows: Upon the shaft C is loosely mounted the ratchet-wheel  $e$ , which is provided with a downwardly-extending sleeve, on which is mounted the power-pinion  $e^2$  and to which is secured one end of the power-spring  $e^3$ , the other end of which is connected to the circular plate G. Between the pinion  $e^2$  and the power-spring  $e^3$  there is mounted upon the sleeve of the wheel  $e$  a washer  $e^4$ , which serves to guide the movement of the rack-bar  $o$ . The rack-bar  $o$  is formed upon the inner end of the push-button bar  $o'$ . The push-button bar extends outside of the case and is provided with a button O on its outer end, by means of which it may be given an inward movement. The length of the rack-bar  $o$  is so regulated with reference to the size of the power-pinion  $e^2$  that the inward movement of the rack-bar will cause such pinion to rotate through a complete revolution, and thus cause the power-spring  $e^3$  to store sufficient power to return the same through a like movement. The push-button bar  $o'$  is prevented from moving out of engagement with the power-pinion  $e^2$  by the upright guides  $o^2$ , which are supported on the circular plate G. On this circular plate is also pivotally mounted the spring-pressed lever P, which engages when the transmitter is at rest with a stop  $d$ , formed on the lower surface of the circuit making and breaking wheel D. The position of the lever P upon the circular plate G is so regulated with reference to the inward movement of the push-button bar that when such bar reaches its extreme inward travel it will press the lever P backward sufficiently to release the stop  $d$  from engagement therewith, and thus permit move-

ment of the circuit making and breaking wheel. As soon as the pressure upon the push-button O is removed movement of the circuit making and breaking wheel will take place and will continue until such wheel has passed through a complete revolution. This results as a consequence of the connection of the circuit making and breaking wheel with the ratchet-wheel  $e$  by means of the pawl  $d^2$ , which is suitably supported upon the lower surface of the circuit making and breaking wheel. This pawl is so constructed as to permit movement of the gear-wheel  $e$  in the direction in which the same moves when power is being stored in the power-spring  $e^3$  without causing any movement of the circuit making and breaking wheel and to only cause movement of the circuit making and breaking wheel when the return movement of the wheel  $e$  commences, due to the action of the power-spring  $e^3$ . Movement of the circuit making and breaking wheel in the direction opposite to that in which such movement takes place is, indeed, directly prevented by the pawl  $d^3$ , which is suitably supported by a shaft  $d^4$ . The circuit making and breaking wheel is therefore permitted to move only in one direction and continuously forward. The rapidity of its movement is governed and regulated by the escapement mechanism F. This mechanism is stationed beneath the circular plate G and is formed as follows:

To the central shaft C is keyed a gear-wheel  $f$ , and upon the same is mounted loosely a frame  $f'$ , secured to the plate G, which frame has mounted therein the escapement-wheel  $f^2$  (in gear with the gear-wheel  $f$  through the action of the intermediate pinion  $f^3$ ) and also the pivoted pallet  $f^4$ . Any movement of the circuit making and breaking wheel, and thereby of the central shaft C, causes a corresponding movement of the gear-wheel  $f$  and through the same of the escapement-wheel  $f^2$  and the pivoted pallet  $f^4$ . The retarding action thus produced is of a character well understood and well adapted for the use to which it is here placed.

The operation of my transmitter is as follows: When the transmitter is at rest, the stop  $d$  upon the lower surface of the circuit making and breaking wheel engages with the pivoted lever P and no movement of the circuit making and breaking wheel is possible. When it is desired to establish any desired connection through the action of the transmitter, the push-button O is pushed inward through the limit of its travel and until the inner end of the push-button bar  $o'$  engages with the pivoted lever P and pushes the same backward out of engagement with the stop  $d$ . By the inward thrust of the push-button bar power is also stored in the power-spring  $e^3$ , through the engagement of the rack-bar  $o$  with the pinion  $e^2$ , and as the pinion  $e^2$  is caused to rotate through a complete revolu-



tion sufficient power is stored in the power-spring to return such pinion and all parts in connection therewith through a like movement. The indicator-plug I may now be inserted in the aperture corresponding to the connection which it is desired to establish. Upon removal of the hand from the push-button the circuit making and breaking wheel will commence to revolve by reason of its pawl connection with the power mechanism. The circuit will be broken and made as each tooth of the circuit making and breaking wheel passes the contact-spring L, and thereby an actuating impulse will be transmitted through the service-wire to the switch of the receiver or other instrument with which the transmitter may be in electrical communication, causing said switch to pass through a movement corresponding to that of the circuit making and breaking wheel. As soon as the circuit making and breaking wheel has moved to a position corresponding to that occupied by the indicator-plug I the lower end of such plug will engage with one of the arms of the spur-wheel N' and will turn the same through a quarter of a revolution, thus causing the contact-spring M to be raised and contact with the conducting-plate K. The circuit through the transmitter will in this manner be short-circuited, and the making and breaking of the circuit by the further revolution of the circuit making and breaking wheel will have no effect upon the switch of the instrument with which it may be in electrical communication, but such switch will be left at a point corresponding with the position of the indicator-plug on the dial of the transmitter, while the circuit making and breaking wheel completes its revolution until it reaches its normal or zero position. In order to bring the switch of the receiver or other instrument with which the transmitter may be in communication back to its normal or zero position, it is necessary to actuate the transmitter a second time, thus causing the same to pass through a second cycle of movement. During this second movement the circuit making and breaking wheel will be inoperative, so far as its transmission of actuating impulses to the switch of the receiver is concerned, until it reaches a point in its revolution where the lower end of the indicator-plug turns the pivotally-mounted plug N through a quarter of a revolution, and the contact-spring M drops out of contact with the conducting-rim K. Further movement of the circuit making and breaking wheel will now result in corresponding movement of the switch of the receiver. The switch of the receiver will be returned to its normal position as the circuit making and breaking wheel assumes a like position.

In the construction which I have thus described the transmitter is short-circuited after the first actuation of the same until the second

actuation occurs. It is desirable for some purposes to prevent such short-circuiting, and in Figs. 4 and 5 I have shown a construction in which this result is accomplished. In this construction the conducting-ring K<sup>x</sup>, corresponding to ring K of Figs. 1 and 2, is made of two strips k<sup>4</sup> and k', which are insulated from each other by the insulating-strip k<sup>2</sup>. The spring L, which makes contact with the teeth of wheel D, is connected to strip k<sup>4</sup> by a wire l<sup>4</sup>, and strip k' is connected by a wire l<sup>5</sup> to binding-post l<sup>6</sup>. Contact-wheel D is connected to binding-post a, as before, through the mechanism of the instrument, and spring M<sup>x</sup>, corresponding to spring M of Figs. 1 and 2, is insulated from wheel D. A circuit through the transmitter can be established only when the contact-spring M<sup>x</sup> contacts with both strips k' and k<sup>4</sup>, as it will when elevated. The contact-spring M<sup>x</sup> is normally held in its raised position by the pivotally-mounted block N, so that the circuit through the transmitter is complete until the circuit making and breaking wheel reaches a position corresponding to that at which the indicator-plug has been placed, and the lower end of such indicator-plug turns the pivotally-mounted block N through a quarter of a revolution, thus breaking the circuit between the contact-spring M<sup>x</sup> and the conducting-rim K<sup>x</sup>. Circuit through the transmitter is now interrupted and can only be restored by a second actuation of the transmitter, when the circuit through the transmitter will be made as the circuit making and breaking wheel reaches a position corresponding to that occupied by the indicator.

It is obvious that many changes and alterations may be made in the constructions which I have herein shown without departing from the spirit and scope of my invention, and I do not restrict myself to the precise construction shown; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In a transmitter, the combination, with circuit-varying mechanism having an actuating member adapted to be moved forward continuously, and means for operating said mechanism, of an indicator, and a reversible operating member which when in one position permits the operation of such circuit-varying mechanism to be effective, and which is adapted to be actuated and reversed by said indicator, thereby making subsequent operation of the circuit-varying mechanism ineffective; whereby the circuit-varying mechanism is effective in its first operation until said indicator operates the said reversible operating member, and then becomes ineffective in operation and so remains until said indicator again encounters said reversible operating member in a succeeding operation of the circuit-varying mechanism.

2. In a transmitter, the combination, with



circuit-varying mechanism having an actuating member adapted to be moved forward continuously, and means for operating said mechanism, of an indicator, and a switch having a reversible operating member, which switch controls the circuit of the instrument, and in one position of its operation permits the operation of the main circuit-varying mechanism to be effective, and in another position renders the operation of such mechanism ineffective; said operating member being arranged to be encountered and reversed by the indicator during each operation of the main circuit-varying mechanism.

3. In a transmitter, the combination, with circuit-varying mechanism having an actuating member adapted to be moved forward continuously, and means for operating said mechanism, of an indicator, and a switch arranged to close a shunt-circuit around such circuit-varying mechanism, and having a reversible operating member which is encountered and reversed by said indicator during each operation of the main circuit-varying mechanism.

4. In a transmitter, the combination with circuit making and breaking mechanism movable in a prescribed path continuously forward, and means for operating the same, of an electrical circuit through said transmitter, normally interrupted by said circuit making and breaking mechanism in its movement, switch mechanism for altering the circuit through said circuit making and breaking mechanism, and thereby rendering said mechanism inoperative to interrupt said circuit, and an indicator, adapted to be set in a path corresponding to that occupied by said circuit making and breaking mechanism in its movement, for operating said switch mechanism.

5. In a transmitter, the combination with circuit making and breaking mechanism, movable in a prescribed path continuously forward, and means for operating the same, of an electrical circuit through said transmitter, normally interrupted by said circuit making and breaking mechanism in its movement, a plate of conducting material, switch mechanism carried by said circuit making and breaking mechanism and adapted to be moved in and out of contact with said plate, and thereby render said circuit making and breaking mechanism operative or inoperative to interrupt said circuit, and means for operating said switch mechanism.

6. In a transmitter, the combination with a circuit making and breaking wheel adapted to move continuously forward, means for operating the same, and a dial having a circular series of apertures formed therein, of an electrical circuit through said transmitter normally interrupted by said circuit making and breaking wheel in its movement, switch mechanism for altering said circuit and thereby rendering said circuit making and breaking wheel inoperative to interrupt said circuit,

and an indicator, adapted to be inserted in the apertures in said dial, for operating said switch mechanism.

7. In a transmitter, the combination with a circuit making and breaking wheel adapted to move continuously forward, means for operating the same, and a dial having a circular series of apertures formed therein, of an electrical circuit through said transmitter normally interrupted by said circuit making and breaking wheel in its movement, a plate of conducting material suspended over said circuit making and breaking wheel, a switch-arm adapted to move in and out of contact with said plate, and thereby render said circuit making and breaking wheel operative or inoperative to interrupt said circuit, and an indicator-plug adapted to be inserted in the apertures in said dial for operating said switch mechanism.

8. In a transmitter, the combination with a circuit making and breaking wheel adapted to move continuously forward, means for operating the same, and a dial having a circular series of apertures formed therein, of an electrical circuit through said transmitter normally interrupted by said circuit making and breaking wheel in its movement, a plate of conducting material suspended over said circuit making and breaking wheel and insulated therefrom, a contact-spring on said circuit making and breaking wheel adapted to contact with said plate and thereby alter the circuit through said transmitter, and means for operating the same.

9. In a transmitter, the combination with a circuit making and breaking wheel adapted to move continuously forward, means for operating the same, and a dial having a circular series of apertures formed therein, of an electrical circuit through said transmitter normally interrupted by said circuit making and breaking wheel in its movement, a plate of conducting material suspended over said circuit making and breaking wheel and insulated therefrom, a contact-spring on said circuit making and breaking wheel adapted to contact with said plate and thereby alter the circuit through said transmitter, an oblong block pivotally mounted on said circuit making and breaking wheel, and adapted to control the position of said spring, and means for operating the same.

10. In a transmitter, the combination with a circuit making and breaking wheel adapted to move continuously forward, means for operating the same, and a dial having a circular series of apertures formed therein, of an electrical circuit through said transmitter normally interrupted by said circuit making and breaking wheel in its movement, a plate of conducting material suspended over said circuit making and breaking wheel and insulated therefrom, a contact-spring on said circuit making and breaking wheel adapted to con-



tact with said plate and thereby alter the circuit through said transmitter, an oblong block pivotally mounted on said circuit making and breaking wheel, and adapted to control the position of said spring, a spur-wheel connected therewith, and an indicator-plug adapted to be inserted in the apertures in said dial and operate said spur-wheel.

11. In a transmitter, the combination with a dial having a circular series of apertures therein, a circuit making and breaking wheel having a roughened periphery, means for moving the same continuously forward at each actuation thereof through a complete revolution, and a contact-spring engaging with the periphery of said wheel, of an electrical circuit through said transmitter normally interrupted by the circuit making and breaking wheel in its movement, a plate of conducting material suspended over said circuit making and breaking wheel and insulated therefrom, connection between said plate and said contact-spring, a contact-spring on said circuit making and breaking wheel adapted to contact with said plate, an oblong block pivotally mounted on said circuit making and breaking wheel adapted to control the position of said spring, a spur-wheel connected therewith, and an indicator-plug adapted to be inserted in the apertures in said dial and operate said spur-wheel.

12. In a transmitter, the combination, with circuit-varying mechanism and power-storing mechanism for driving the same, of an operating device for operating said power-storing

mechanism, and a detent for said circuit-varying mechanism which said operating device engages in its movement, thereby releasing said circuit-varying mechanism.

13. In a transmitter, the combination, with circuit-varying mechanism having an actuating member adapted to be moved forward, but having no backward movement, and power-storing mechanism for driving the same, of an operating device arranged when moved in one direction to store power for operating said actuating member, and adapted when released to be returned, and a detent for said actuating member, which said operating device engages in its forward movement, thereby releasing said actuating member.

14. In a transmitter, the combination, with a circuit-controlling mechanism having an actuating member adapted to be moved forward continuously, and a case inclosing said mechanism, of an automatically-retained operating-bar projecting from said case, ratchet mechanism for communicating the return movement of said bar to said actuating member, and a detent for said actuating member, which said operating-bar engages in its forward movement, thereby releasing said actuating member.

In testimony whereof I affix my signature in presence of two witnesses.

ANTHONY VAN WAGENEN.

Witnesses:

ANNA BODEN,  
CHAS. M. SWAN.