

(No Model.)

3 Sheets—Sheet 1.

W. W. LE GRANDE & G. W. BURTON.

WATCHMAN'S ELECTRIC SIGNAL BOX.

No. 352,549.

Patented Nov. 16, 1886.

Fig. 1.

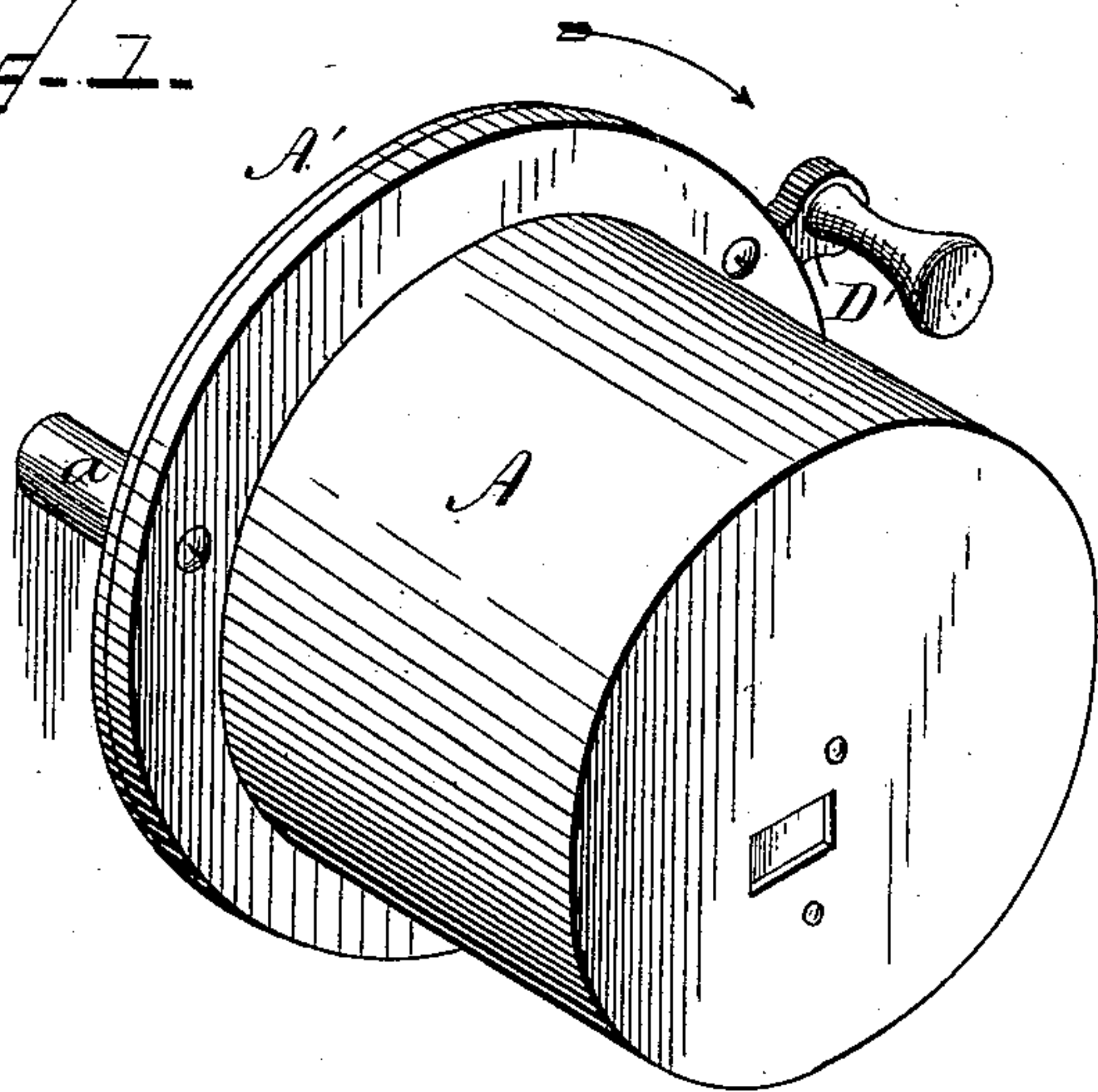
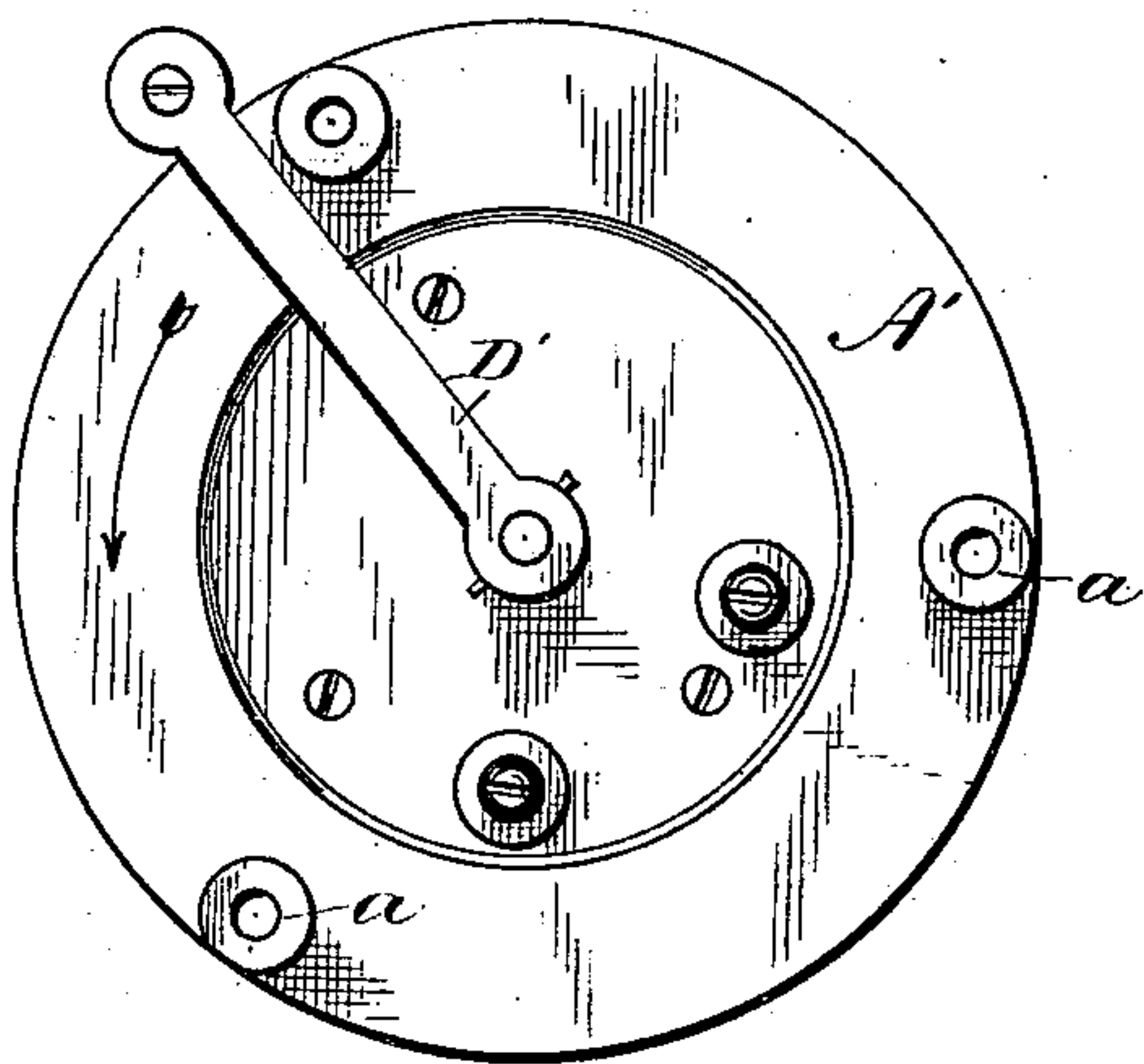


Fig. 2.



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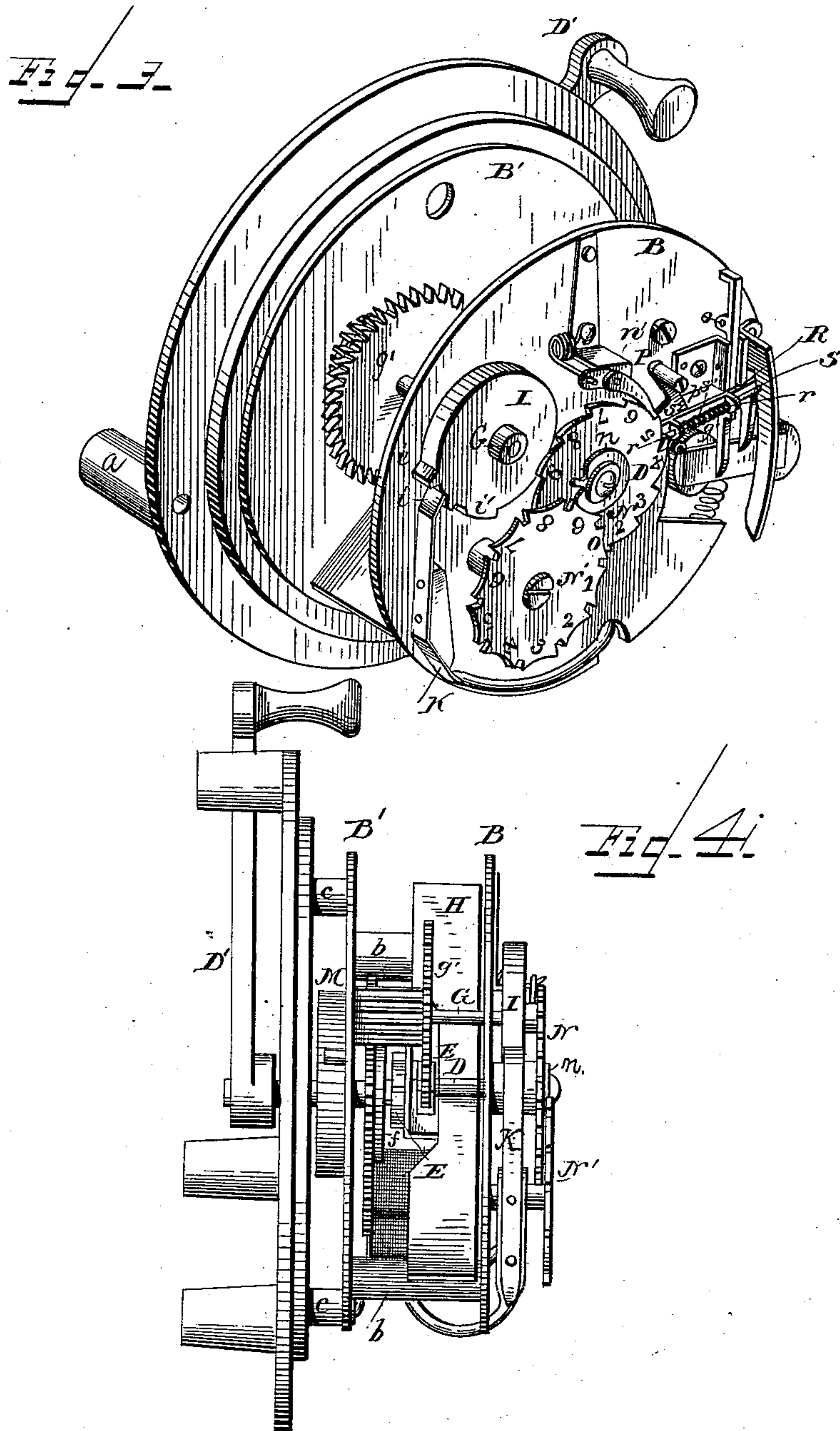
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Fig. 5.

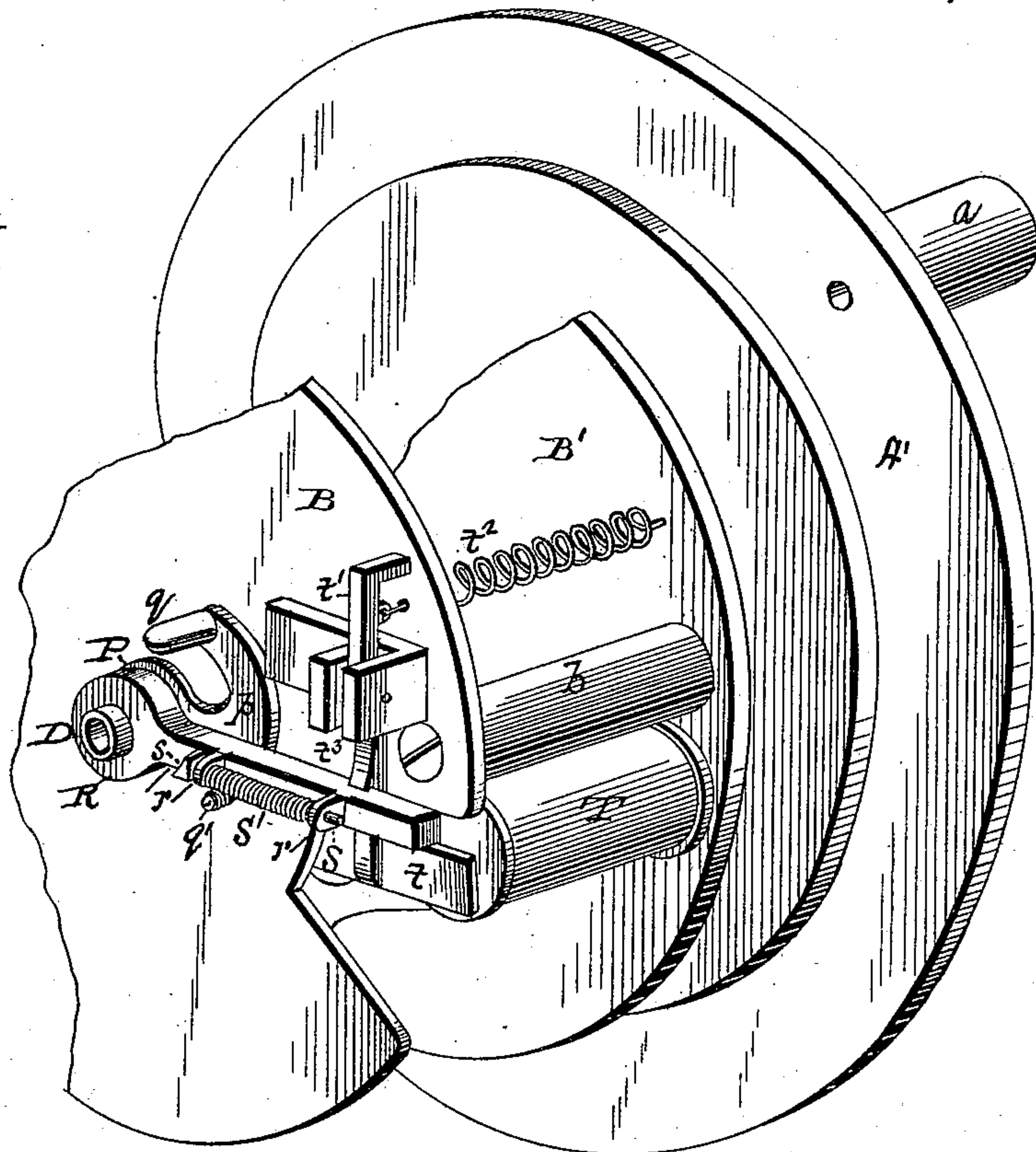
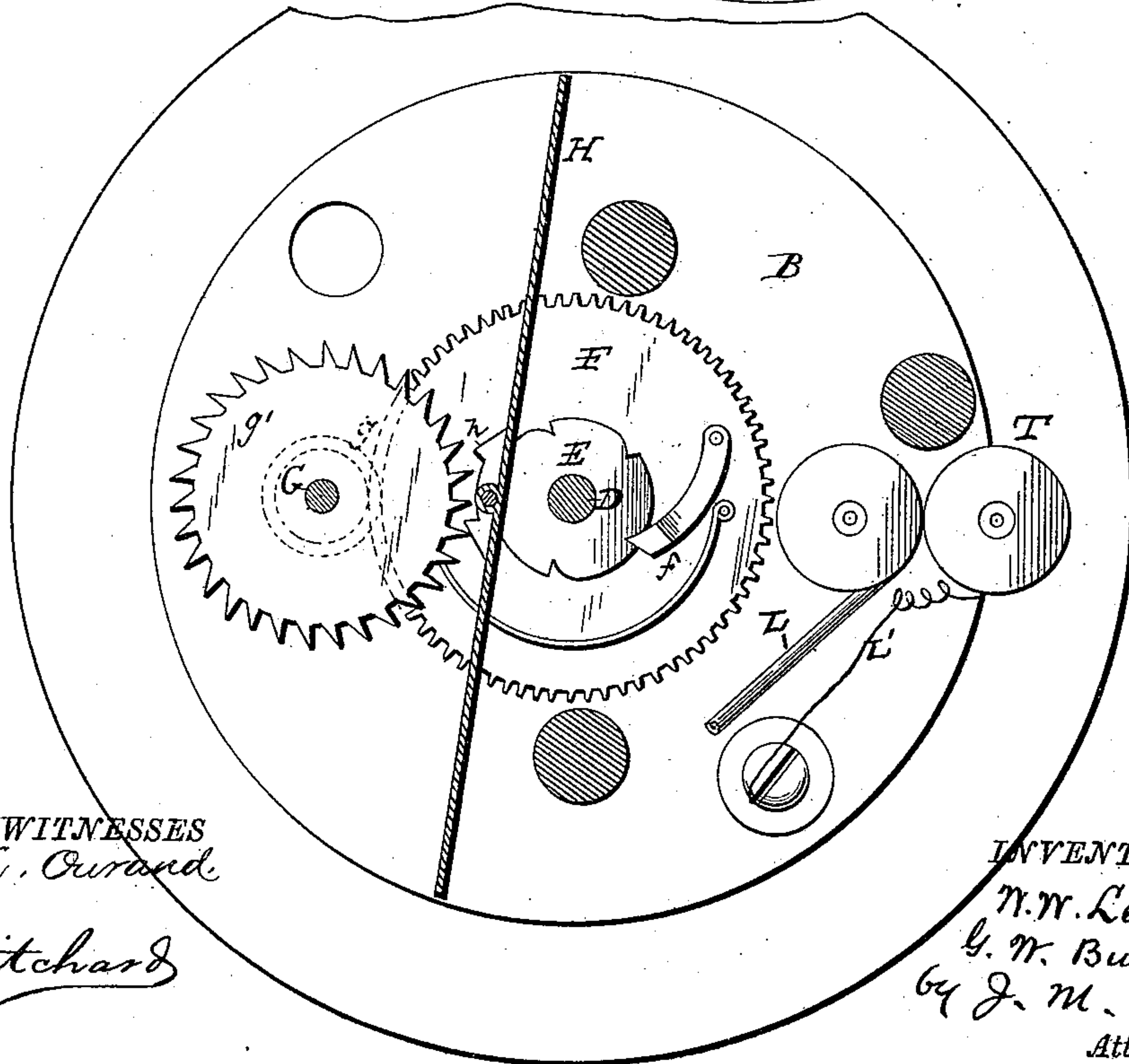


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM W. LE GRANDE AND GEORGE W. BURTON, OF LOUISVILLE, KENTUCKY; SAID LE GRANDE ASSIGNOR TO SAID BURTON.

WATCHMAN'S ELECTRIC SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 352,549, dated November 16, 1886.

Application filed February 9, 1886. Serial No. 191,291. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. LE GRANDE and GEORGE W. BURTON, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Watchmen's Electric Signal-Boxes, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to an improved watchman's automatic signal-box for use in a watchman's electric control system, its objects being, first, to provide an apparatus of this class in which a registering mechanism for indicating the number of times the box has been visited by the watchman will be directly operated by the hand of the watchman in winding up the spring for sending a signal, instead of depending for its operation upon the force of the spring in unwinding, as heretofore; secondly, to prevent the registering mechanism within the box from being set for operation for registering, except when the signaling-circuit of the box is complete; and, thirdly, to so arrange the make and break devices that even should the box be cut out of circuit and the crank turned to operate the same and afterward be put in circuit, the circuit will not be closed and battery uselessly consumed, but that at a proper time, when the mechanism is closing and breaking the circuit to send each complete signal, the registering devices will be placed in proper condition for making a single registration when subsequently operated by the act of the watchman in winding up the spring.

Our invention consists in certain novel combinations and arrangements of devices comprising a station signal transmitting and registering apparatus designed to carry out the objects stated, and the same will be readily understood from the following particular description, in connection with the accompanying drawings, in which—

Figure 1 is a front perspective view of one of our station signal-boxes. Fig. 2 is a rear elevation of the same. Fig. 3 is a perspective view of the interior parts with the cap or cover removed. Fig. 4 is a side elevation of the same. Fig. 5 is a perspective view, on an

enlarged scale, of the electro-magnet, its armature, and the tripping devices. Fig. 6 is a plan view of the gear-wheel, make-and-break wheel, and the escapement-wheel, also showing the electro-magnet and its circuit-connections.

The letter A indicates simply a cap or cover secured to a base or back plate, A', provided with short hollow legs *a*, through which pass the screws for securing the box to a wall or other support. The legs cause the back plate to stand off from the wall, so that the circuit-wires may be conveniently connected at suitable points behind the box.

The working parts of the apparatus are supported by a frame within the box, said frame being composed of plates B and B' and intermediate posts or pillars, *b*. The rear plate, B', is separated from the base-plate of the box by lugs *c*, through which pass the screws for holding the frame in place. At the center of the frame is mounted a shaft, D, the ends of which project, respectively, in front of the front plate, B, and behind the base-plate A' of the box.

Upon the shaft D, and between the front and rear plates of the frame, is fixed a ratchet-wheel, E, and behind the ratchet-wheel a gear-wheel, F, is mounted loosely on the shaft, and has pivoted to its front face a spring-pawl, *f*, which engages with the teeth of said ratchet-wheel. The gear-wheel F engages with a pinion, *g*, on a shaft, G, which also carries an escapement-wheel, *g'*, which is governed by a pallet, *h*, and fan H, mounted in the usual manner. The end of this shaft G projects in front of the front plate, B, and carries the make-and-break wheel I, the teeth *i i* and *i'* of which come in contact with a metallic spring, K, as the wheel revolves, and thus close the circuit intermittently for sending signals in the well-known manner.

Between the rear plate, B', of the frame and the base-plate A' of the box is located a coiled impelling spring, M, having its inner end secured to the shaft D, and its outer end secured to a fixed pin. Upon the rear projecting end of shaft D is fixed a handle or lever, D', by which it may be turned for properly straining the spring. Suitable stops limit the move-

ment of the handle in both directions. When the handle is moved in the direction of the arrow until it strikes its stop and is then released, the shaft D will have been turned sufficiently for a fresh tooth of the ratchet-wheel E to engage the pawl of wheel F; and the reaction of the spring will return the shaft; and the ratchet-wheel will carry with it the wheel F, which will turn the shaft G and make-and-break wheel I one complete revolution, causing the teeth *i i'* to contact with the spring K and close the circuit as many times as there are teeth. For work in open circuit, by changing the make-and-break wheel I, bringing spring K to rest thereon, and adapting the lever *t'* and also changing the position of spring *t''*, the box may be adapted to closed-circuit work. The course of the circuit will be presently pointed out.

It is the duty of a watchman to visit the box and to turn in signals at stated times to show that he makes his visits. The signals are usually registered or recorded automatically at a main station by suitable devices, such as a combined clock and electro-magnetic recording apparatus, as shown in the patent of W. W. Le Grande, No. 303,298, granted August 12, 1884. It is also desirable that the watchman shall personally register his visits at each box by means within the box, and prevented from making false registration with the central recording apparatus by improper connections or breaks at some point on the line. We therefore mount upon the front projecting end of the shaft D a toothed registering-wheel, N, which may be turned independently of the shaft. With this registering-wheel a notched multiplying register-wheel, N', is arranged in the usual manner, to be operated by a trip, *n*. The wheel N is held steady and prevented from backward movement by a spring-pawl, *n'*.

Behind the register-wheel N there is fixed to the shaft D a radial arm, P, which projects beyond the periphery of the wheel and carries at its outer end a cross-arm, *p*, from the extremities of which pins *q q'* project forwardly. In front of this arm P, but behind the register-wheel, a radial arm, R, is pivoted loosely upon the shaft D, and extends outward between the pins *q q'* and considerably beyond the cross-arm *p*. On this pivoted arm are lugs *r r*, in bearings in which is arranged a sliding trip-rod, S, the inner end of which is provided with a foot, *s*, to engage the teeth of the register-wheel. Around the trip-rod S is coiled a spring, *s'*, one end of which bears against the outer lug, *r*, while the other end bears against a pin, *s''*, projecting from the rod, and so presses the foot of the rod against the periphery of the register-wheel N. When the main shaft D is turned by its handle to wind the spring for sending a signal, the arm P will swing with the shaft, and the pin *q* on cross-arm *p* will strike the pivoted arm R and move it also, so that the trip-rod S, having its foot engaged with a tooth of the register-wheel, will move

said wheel the required distance to count one unit—that is, the space of one tooth of the wheel. As the shaft D is turned back again by its driving-spring, the pin *q* leaves the arm R and the pin *q'* strikes it, carrying it back against a suitable stop, which limits its backward motion. As the said arm R moves backward, the foot of the trip-rod S slips over the inclined face of a tooth of wheel N, and engages its front or abrupt edge, ready to move the wheel the space of another tooth. The numbers on the registry-wheels show through a suitable opening in the front wall of the box-cap. It will be now seen that each time the apparatus is operated to send in a signal the fact of such operation is registered within the box, and it will be further noted that the registration is directly performed by the person turning the shaft D to wind the spring, instead of by the spring in unwinding, as has heretofore been the case in registering signal-boxes. Our apparatus is thus rendered more certain in its operation than if we relied upon the spring.

In order to prevent fraudulent registration on the part of the watchman, we have provided means for preventing any registration from being made, except when the apparatus is operated for actually turning in a signal and the circuit of the signal devices is complete. One of the line-wires, as L, which enters the box, connects with one terminal of the coils of a small electro-magnet, T, the other terminal of which is connected with the metallic spring K, and through the same to the make-and-break wheel when the teeth of said wheel strike said spring. The other line-wire, as L', connects directly with the base-plate of the box, and through the metallic frame to the make-and-break wheel. The armature *t* of the electro-magnet T is carried by a lever, *t'*, which is retracted by a spring, *t''*. Upon the back edge of the lever *t'* is a shoulder or stop, *t'''*, which, when the lever is retracted, stands in the path of the pivoted arm R, and will prevent said arm from carrying the trip-rod back sufficiently far to engage a fresh tooth of the registering-wheel, so that said trip-rod will not be placed in proper position for further registration. When, however, the magnet is energized by the closing of the circuit, the armature will be attracted and the shoulder on the lever *t'* will be drawn out of the path of the arm R, so that the same may move back a proper distance to cause the trip-rod to engage a fresh tooth, ready for another registration.

In using the first registering-boxes we got up, a watchman could break the line-circuit temporarily outside and then operate the registering mechanism to falsely indicate that any number of visits had been made. Then, after mending the circuit, he could, at some point where he might desire to remain or where he could easily visit, break and make the wire circuit easily, and at proper intervals send in his signals without visiting the box, though

the registration he had made would indicate that he had gone his regular rounds, so far as visits to the box are concerned. In our box the last tooth, i' , of the make-and-break is arranged to close circuit just as the arm R, in moving back, reaches the shoulder or stop t^3 on the armature-lever, and said arm therefore passes over said shoulder to its proper starting-point if the circuit is completed by said tooth, but not otherwise. It is therefore impossible to make successive registrations at improper places without the same being detected at the main or central office or at the boxes.

Although it is necessary that the circuit shall be closed to place the registering mechanism in proper condition, we do not keep the circuit normally closed, but provide especially that it shall be open, when the apparatus is not in use for signaling, when the box is operated on an open-circuit line. This we do by so constructing the box that after it has been operated the make-and-break wheel I will continue its revolution after the shoulder t^3 stops the arm R until all the teeth on wheel I have passed the spring K.

On reference to the drawings it will be seen that all the teeth of the make-and-break wheel I are out of contact with the spring K. This is the normal position of the wheel when the box is at rest, and however many teeth it may have, its normal position, from which it always starts and to which it will always return on completing a revolution, is such that the last tooth of the series will have passed out of contact with spring K before the wheel stops.

Having now fully described our invention and explained the operation thereof, we claim—

1. The combination, with the handle, shaft D, spring, and signal-wheel, of the toothed registering-wheel, the pivoted rod R, the trip-rod carried by said pivoted rod and having a foot to engage the registering-wheel, and suitable means connected with shaft D for operating said pivoted rod, substantially as described.

2. The combination, with the pivoted rod R, arranged to operate the registering devices, of the electro-magnet T in the box-circuit and the armature-lever having a shoulder or stop arranged to stand in the path of said lever when the box-circuit is broken, substantially as and for the purpose set forth.

3. The combination, with the registering mechanism and a lever or arm for operating the same, of the electro-magnet having an armature-lever arranged to arrest said arm when the magnet is not energized, as set forth.

4. The combination, with the registering mechanism, the pivoted arm R, arranged to operate the same, and the electro-magnet having its armature-lever provided with a shoulder or stop arranged to stand in the backward path of said arm when the magnet is not energized, of the make-and-break wheel having one of its teeth arranged to close a circuit through said magnet when said pivoted arm reaches said shoulder or stop, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM W. LE GRANDE.
GEORGE W. BURTON.

Witnesses:

T. JOHNSTON,
CHAS. C. BOSSUNG.