

(No Model.)

F. W. COLE.

SIGNAL BOX.

No. 365,365.

Patented June 28, 1887.

*Fig. 1,*

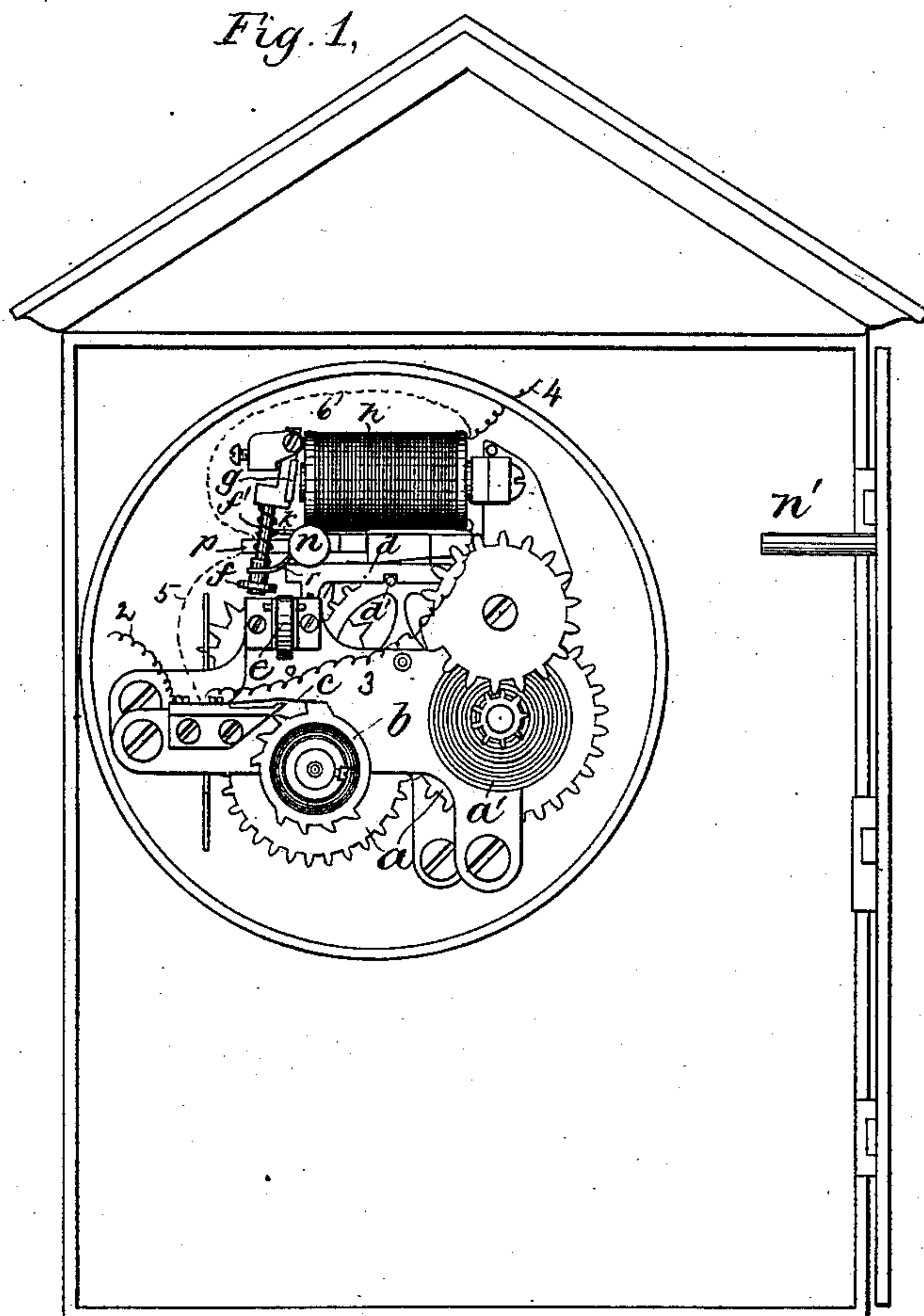
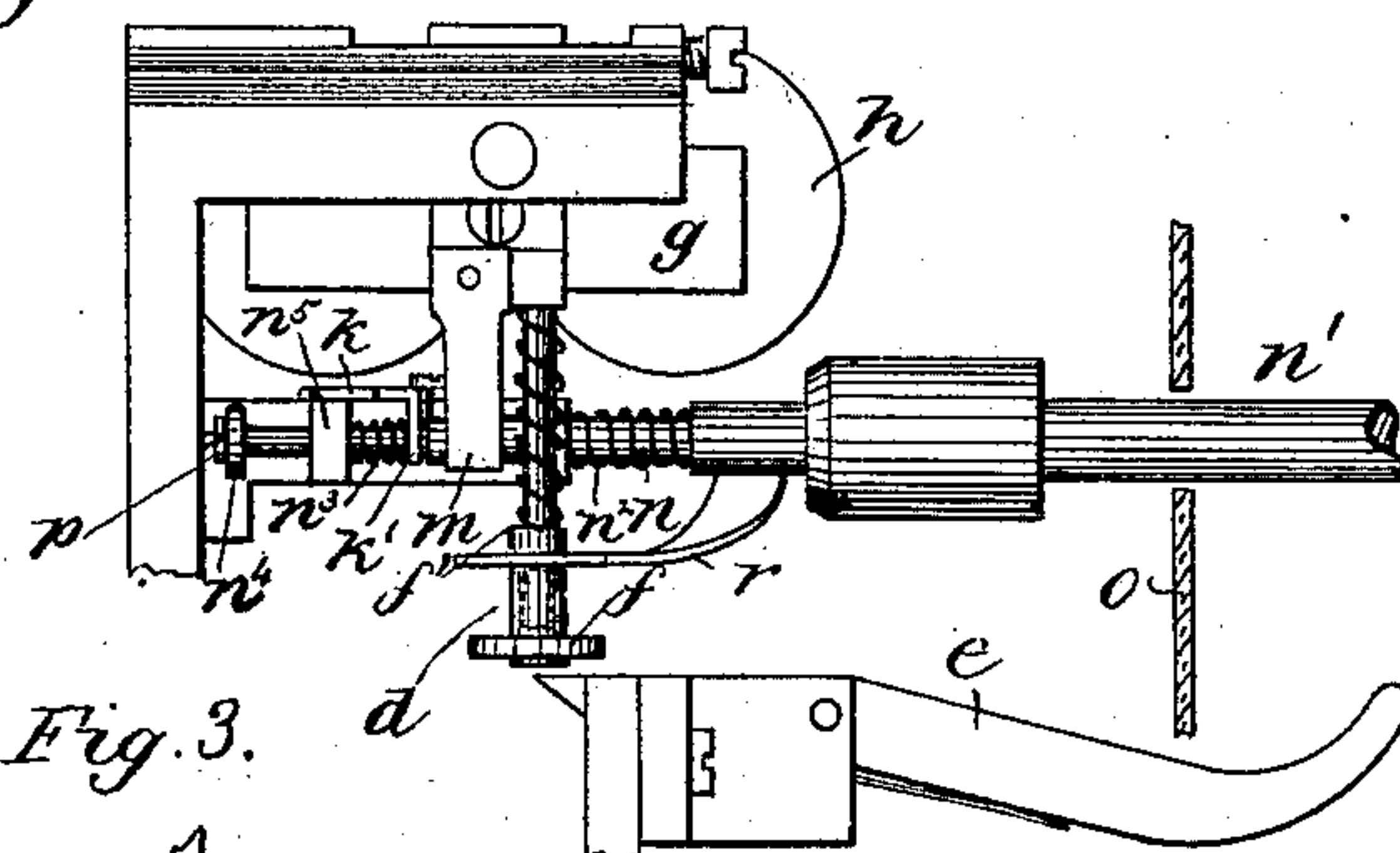
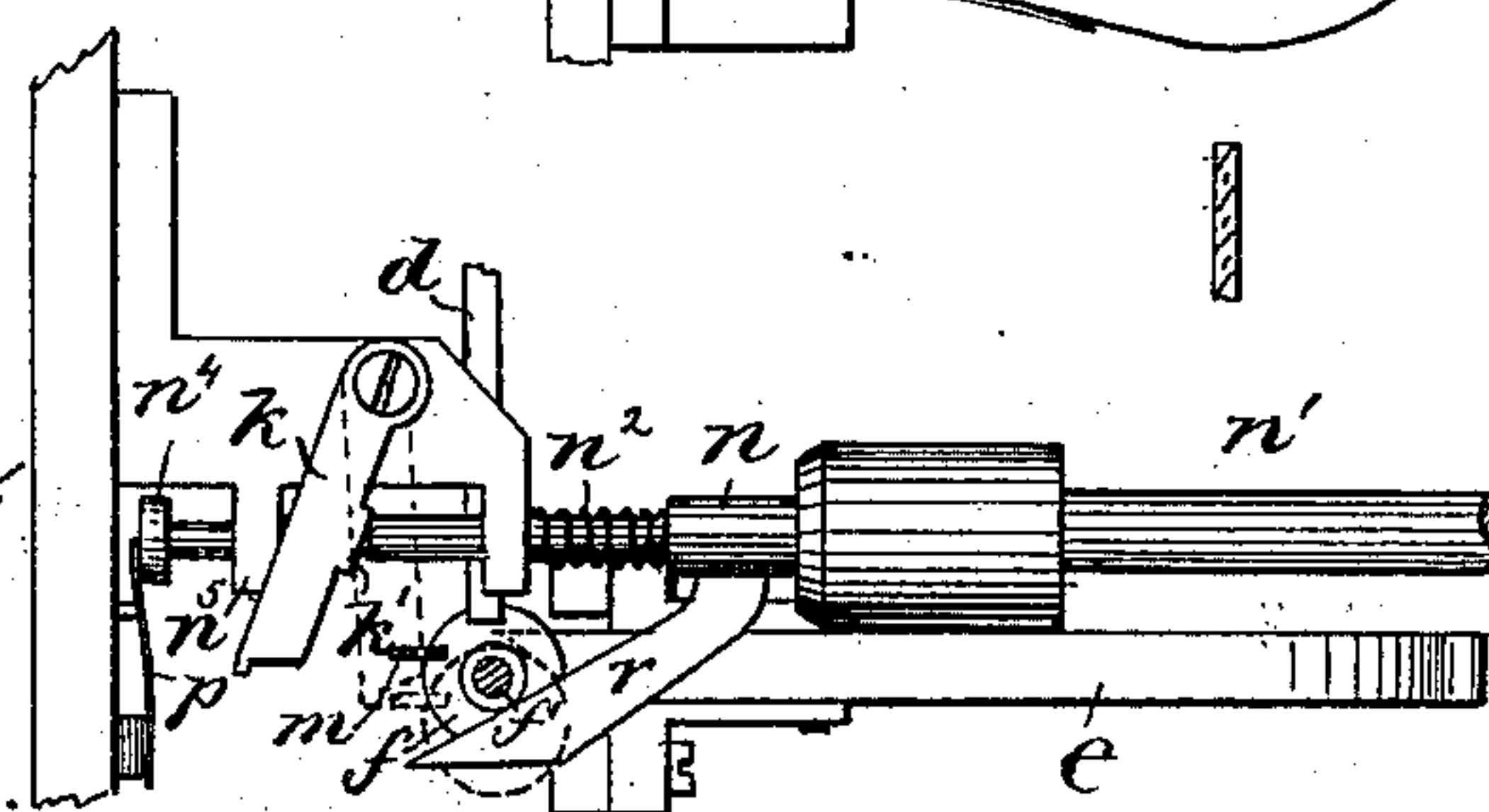


Fig. 2,



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 365,365, dated June 28, 1887.

Application filed January 22, 1887. Serial No. 225,053. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK W. COLE, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Signal-Boxes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention, relating to signal-boxes for fire-alarm-telegraph apparatus, consists, mainly, in novel devices for effecting non-interference of the different boxes by preventing an alarm from being transmitted from a second box while an alarm is going in from some other box.

The invention is embodied in a box resembling in its construction and mode of operation the box shown and described in Letters Patent No. 223,218, dated January 6, 1880, and that represented in Patent No. 232,343, dated September 21, 1880. In the former patent, when a signal is being transmitted from any given box the pulls or starting levers of all other boxes are mechanically rendered inoperative by the action of an electro magnet and polarized armatures therefor, which removes an intermediate device from between the pull or starting lever, and the detent or locking lever of the train of wheel-work that actuates the break-wheel, which intermediate device or block is necessary in order to cause the starting-lever to engage and operate the detent-lever. This mode of operating the intermediate device or block, that governs the effect of the starting-lever or the detent-lever, requires that the character of the current shall be different while a signal is being transmitted from what it is when no signal is being transmitted.

In Patent No. 232,343 the pull is controlled by a neutral electro-magnet and armature, which latter, when the circuit is broken while the box-door is open, falls out of the field of the said magnet and blocks the pull or detent lever of the train of wheel-work by mechanical devices differing considerably from those previously mentioned.

The present invention is embodied in a signal-box in which the action of the pull or starting lever on the detent or locking lever of the train of wheel-work is controlled by an intermediate device or block similar to that re-

ferred to in Patent No. 223,218, but in which the movement of the said intermediate device is controlled by a neutral electro-magnet, the armature of which is not, however, retracted out of the field of the magnet; and the invention consists, mainly, in the combination of these devices—namely, the pull, the detent lever, the intermediate device and its controlling electro-magnet and armature, with a locking device for said armature controlled by the door of the box in such manner that if the circuit is broken when or immediately after the door of the box is opened, as will take place if a signal is being transmitted from some other box, the said locking device will retain the armature of the magnet in its retracted position, and will thus prevent it from moving the intermediate device into the position to make the pull operative, which pull cannot be operated until the box is closed and again opened after the previous signal has been wholly completed.

The invention also consists in other details of construction, hereinafter pointed out, and also in the combination, with the locking device before mentioned, of a shunt-circuit closer for the controlling-magnet operated either by the said locking device itself or by the movement of the box-door in such manner as to break the said shunt and energize the magnet, provided the circuit is closed before the said locking device can act to retain the armature in its retracted position.

Figure 1 is a front elevation of a signal-box, embodying this invention, with the parts in the position assumed if the box is opened when a signal is being transmitted from any other box on the same circuit; Fig. 2, a side elevation of the devices that control the starting of the box-motor, on a larger scale than in Fig. 1, and in the position assumed when the box-door is closed; and Fig. 3, a plan view of the devices shown in Fig. 2.

The mechanism of the signal-box comprises a train of wheel-work, *a*, actuated by a main spring, *a'*, and adapted to rotate the break-wheel *b*, which, in co-operation with a pair of springs, *c*, alternately opens and closes the circuit 2 3 4 when the train or motor is in operation, which parts may all be of any suitable



construction, being shown as substantially like that represented in Patent No. 223,218, before referred to, the said train being controlled by a detent or locking lever, *d*, which engages by a notch with a pin, *d'*, on one of the wheels of the train, which wheel is permitted to make one complete rotation if the said lever is once raised. The said detent is operated by a pull or starting device, *e*, which, as best shown in Fig. 3, cannot engage directly with the said detent *d*, but which may engage an intermediate piece, shown as a sliding flange or collar, *f*, which may itself be moved into position to engage the starting-lever when the said collar is raised by the pull *e*, or may be moved from position to engage the starting-lever *e*, as shown in Figs. 1 and 3, in which case the said pull may be operated without producing any effect on the detent or locking lever *d*. This operation of the intermediate piece or sliding collar, *f*, is substantially the same as in Patent No. 223,218, before referred to, and, as in the said patent, the said collar *f* is longitudinally movable on a rod or stem, *f'*, connected with the armature *g* of an electro-magnet, *h*; but the armature *g* is unlike that used in the Patent No. 223,218, inasmuch as it is not polarized, but is operated by the attraction of the magnet *g* and the opposing action of a retractor by the closing and breaking of the circuit, and not by reversal in polarity of the current, as in the former patent. It results, from this difference in construction, that unless in some way prevented, the armature *g* and connected collar *f* would be vibrated back and forth at each opening and closing of the circuit while an alarm was being transmitted from the same or any other box on the circuit—an effect which does not take place when the polarized armature is used.

In order to prevent the armature *g* from being moved by the attraction of the magnet *h*, in case the box is opened for the purpose of sending an alarm while another alarm is being transmitted from some other box on the same circuit, the said armature and collar are, in accordance with the present invention, provided with a locking device, shown as a pivoted arm, *k*, (best shown in Fig. 3,) which co-operates with a finger or projection *m* from the armature *g* in such manner that when the said locking device *k* is moved to the dotted-line position, Fig. 3, it holds the armature in its retracted position. The locking device *k* is normally held in its full-line position, Fig. 3, by a slide-rod, *n*, engaged and pressed inward by a projection, *n'*, on the door of the box, (see Fig. 1,) and is acted upon by a spring, *n<sup>2</sup>*, tending to move the slide-rod outward, so as to permit the locking-arm *k* to be moved by a lighter spring, *n<sup>3</sup>*, from the full to the dotted line position, Fig. 3, the said arm *k* having a forked portion, *k'*, that embraces a part of the rod *n* of reduced diameter and is held against the shoulder formed by the part of larger diameter by the spring *n<sup>3</sup>*, interposed between the said fork *k'* and the guide-piece or sup-

port *n<sup>5</sup>* for the rod *n*. If the circuit is closed when the box-door is open, the magnet *h* will be energized and the armature attracted, keeping the collar *f* in the position to engage the detent *d* and operate the same when the pull *e* is moved by the operator; and, with the armature in this position, the projection *m* will be in the path of the locking-arm *k*, which, when the slide-rod *n* is permitted to move outward by the action of the spring *n<sup>2</sup>* upon the opening of the box-door, will be held by the lighter spring *n<sup>2</sup>* bearing against the side of the projection *m*, and will consequently produce no effect on the armature, which will retain the collar *f* in position to operate the detent. If, on the other hand, a signal were being transmitted from some other box on the line, the circuit would either be broken at the moment that the box-door was opened, or immediately after, (as the periods of closure in transmitting a signal are of very short duration,) and the moment that the armature was retracted upon such breaking of the circuit the locking device *k* would be thrown by the spring *n<sup>2</sup>* into the dotted-line position, Fig. 3, thus holding the armature away from the poles of the magnet and the collar *f* in such position that the detent cannot be operated. This locking device *k* thus prevents the possibility of a person starting the box during one of the momentary closures of the circuit that occur during the transmission of a signal, and it is not until the box-door has been closed, so as to disengage the locking device *k* from the finger *m*, and the circuit closed long enough to permit the opening of the box and operation of the starting-lever by the operator, that the box under consideration can be set in operation—conditions which cannot exist until the previous signal has been completed.

It will be understood that the mechanism described, with the exception of the end of the pull *e*, is behind a glass or other plate, *o*, (see Fig. 2,) having an opening sufficient for the projection *n'* to pass through, but too small to enable a person to tamper with the slide-rod *n* and locking device *k*, actuated thereby.

It is preferable, though not necessary, to combine with the devices thus far described a circuit-closer, *p*, (see Fig. 3,) forming part of a branch, 5 6, of low resistance around the magnet *h*, which circuit-closer is operated either by the slide-rod *n* or by some projection on the door of the box other than the one *n'* in such manner that the said circuit-closer *p* will be opened before the locking device *k* reaches the projection *m*, so that if the circuit is at that time closed the magnet will be energized and the collar *f* moved into position to operate the detent before it can be engaged by the locking device *k*, and retained in the position to render the said collar *f* inoperative.

It is obvious that the details of mechanical construction may be widely varied without departing from the invention, the main feature of which consists in the combination, with an electro-magnet and its armature, of a



device operated by the latter to render the pull or starting device of the box operative or inoperative by the movement of the said armature while in the field of its magnet, and  
 5 a locking device for retaining the said armature in position to make the box-starting device inoperative after it has once been brought to such position by the change in the circuit produced by the transmission of another signal  
 10 over the same circuit, and retain it so until the said previous signal is completed. The end of the locking device *k* is shown as inclined or cam-shaped, and it may act by its pressure against the finger *m* to retract the armature of the magnet, if it is demagnetized  
 15 when the said locking device is bearing against the said finger.

It is preferable, though not absolutely essential, to provide a mechanical device for restoring the armature when the box-door is closed, which will co-operate with the shunting device *p* for the magnet, so as to mechanically keep the armature up to the poles of the magnet when the latter is demagnetized by  
 25 being shunted, and the shunting and restoring devices are so arranged that the shunt is broken before the restoring device permits the armature to move any considerable distance from the magnet. The armature-restoring device  
 30 is shown in this instance as consisting of a finger or projection, *r*, connected with the rod *n*, that operates the locking device, and is itself operated by the box-door, said finger being inclined or cam-shaped and engaging the sliding collar *f*, and thus acting on the armature  
 35 to move it up to the poles of the magnet as the box-door is closed.

It is obvious that the herein-described locking device is equally applicable to the armature of the magnet that controls the operation of the box by shunting the break-wheel instead of rendering the pull mechanically inoperative, such a box being shown, for instance, in Letters Patent No. 165,118, dated July 27, 1875,  
 45 and the effect of such locking device will be substantially the same as in the present application—namely, to prevent the armature from moving forward at each closure of the circuit during the transmission of the signal  
 50 if the box-door is open—and thus removing the possibility of breaking in on a signal by operating the pull of another box during one of the momentary closures of said signal.

I claim—

55 1. In a signal-box, the combination of the pull or starting device and detent or locking device of the break-wheel motor, and an intermediate device controlling the engagement of said starting and locking devices, with an

electro-magnet and its armature controlling 60 said intermediate device, and a locking device for said armature, substantially as and for the purpose set forth.

2. The combination of an electro-magnet and its armature, that controls by its position 65 the operation of the signal-box, with the locking device for said armature, and an actuating device engaged and operated by the door of the box, whereby said locking device is removed from co-operation with the armature when the  
 70 box-door is closed and permitted to co-operate therewith when the box-door is opened, substantially as described.

3. The combination of an electro-magnet and its armature for controlling the operation 75 of the signal-box, and a locking device for said armature operated by the door of the box, with a shunt or circuit of low resistance around said magnet, and a circuit-breaker therein operated by the door of the box which co-operates with  
 80 the said circuit-breaker and locking device, as described, whereby the circuit-breaker is opened before the locking device comes into co-operation with the armature in the opening of the box-door, substantially as and for the  
 85 purpose described.

4. The combination of the starting device and detent with an intermediate device by which the former engages the latter, and an electro-magnet and its armature operatively 90 connected with said intermediate device, a spring-pressed locking device for said armature, and a spring-pressed slide rod operated by the door of the box and governing the said locking device, substantially as described. 95

5. The combination of an electro-magnet and its armature, that controls by its position the operation of the signal-box, with a locking device for the said armature, and a restoring device for said armature, both operated by the  
 100 door of the box, substantially as described.

6. The combination of an electro-magnet and its armature, that controls by its position the operation of the signal-box, with a locking device for said armature, a restoring device 105 for said armature, and a shunt or circuit of low resistance around the said magnet, and a circuit-breaker therein, and a movable door for the box that operates the said circuit-breaker and armature locking and restoring  
 110 devices, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK W. COLE.

Witnesses:

JOS. P. LIVERMORE,  
 JAS. J. MALONEY.