

(No Model.)

F. W. COLE.

NON INTERFERING SIGNAL BOX.

No. 380,022.

Patented Mar. 27, 1888.

Fig. 1.

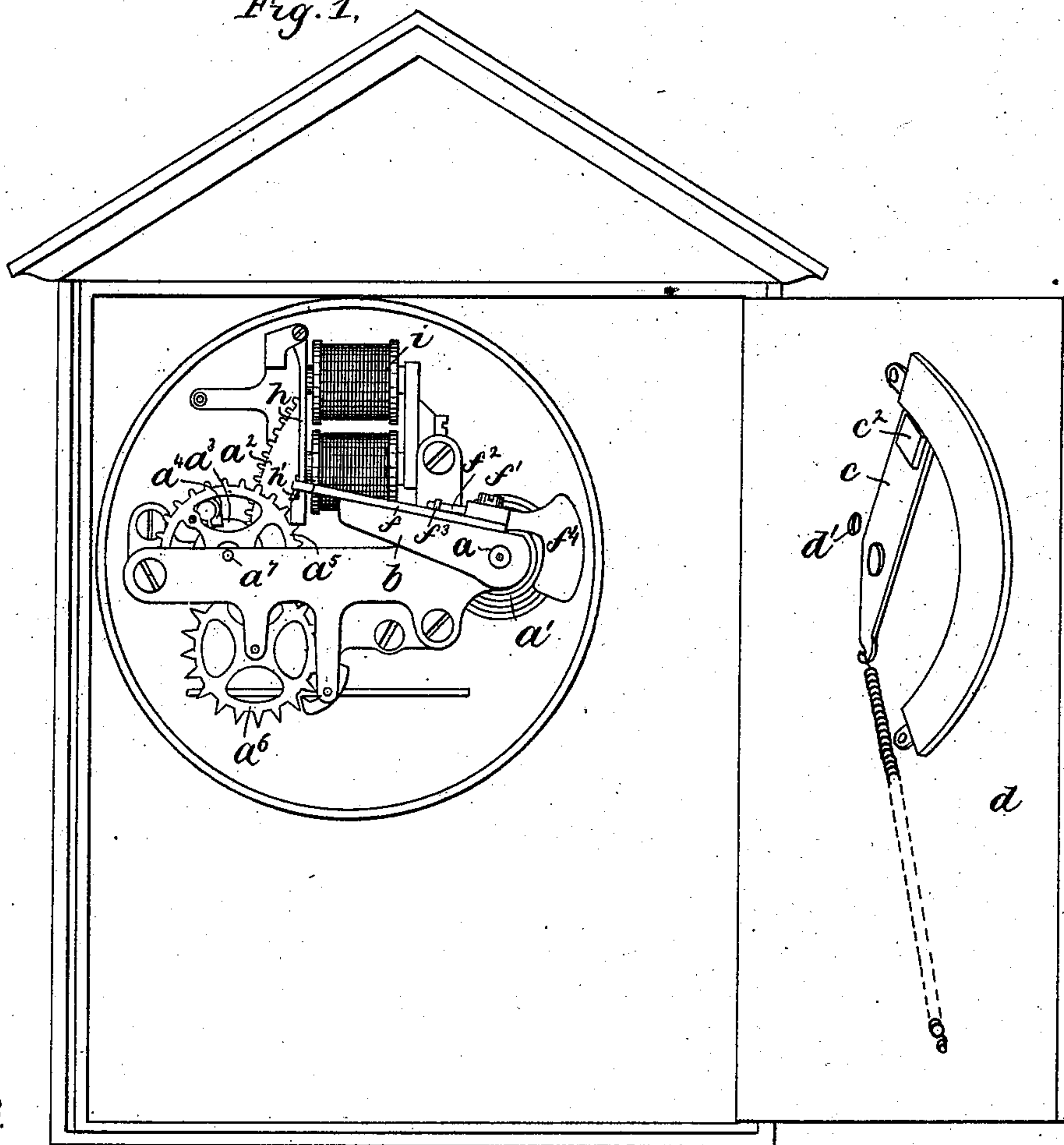


Fig. 3.

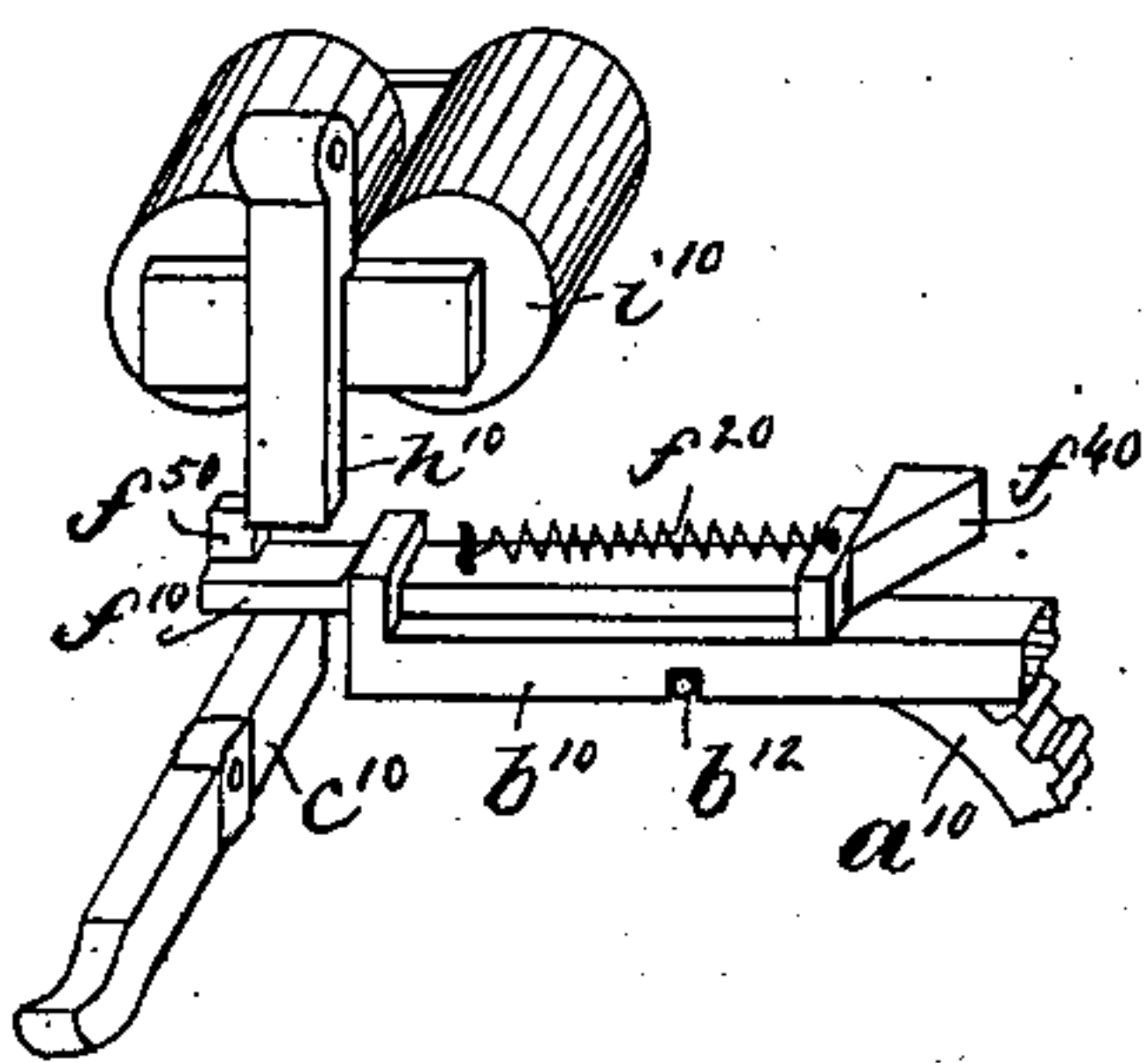
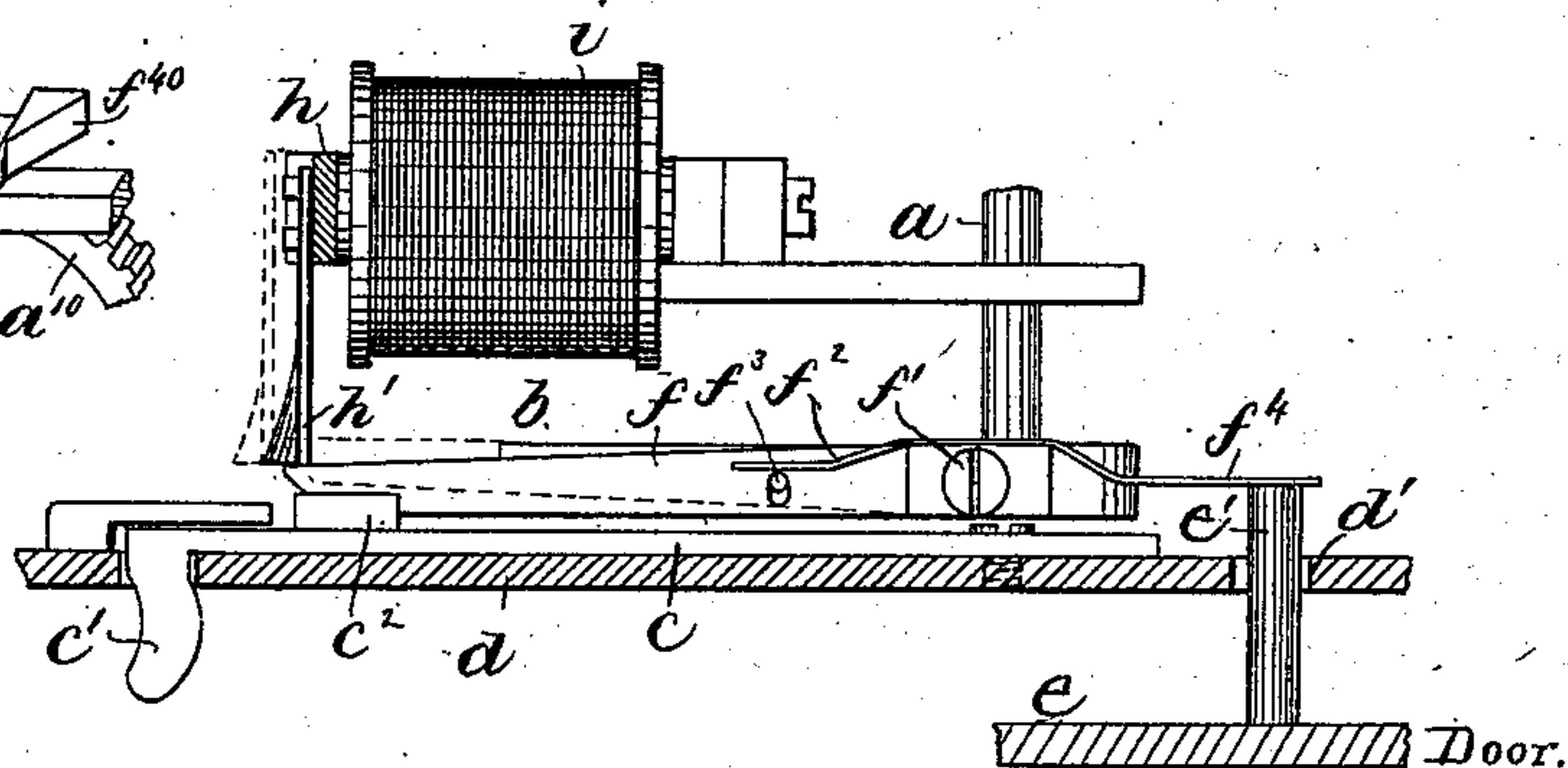


Fig. 2.



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UNITED STATES PATENT OFFICE.

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NON-INTERFERING SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 380,022, dated March 27, 1888.

Application filed January 22, 1887. Serial No. 225,082. (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 Non-Interfering 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 relates to a fire-alarm signal-box, and is shown embodied in a signal-box of the kind commonly known as a "segment-box," in which the pull or operating device of the box winds its actuating spring or weight, which then operates the box, at the same time returning its winding-arm to the normal position; but the invention is also applicable to a box in which the spring of the box-motor is wound for a number of operations, and released at each operation by a detent or locking device operated by the pull; and for convenience the device that acts directly on the break-wheel motor—namely, the winding arm in one class of boxes and the detent in the other—will be herein called the "box-controlling" device, and the device that is engaged and moved by the operator when a signal is to be given will be called the "pull" or "operating" device. In boxes of the kind which are wound by the pull for each signal the controlling device or winding-arm, which is attached to the weight or spring shaft of the train of wheel-work, is commonly engaged by a concentrically-pivoted arm on an inner door or plate of the box, so that when the said arm on the plate, which, as herein shown, constitutes the box-operating device or pull, is moved by the operator it will also move the winding-arm of the motor and wind the spring.

The present invention consists, mainly, in an engaging device for controlling the engagement of the operating device with the controlling device—that is, the winding-arm in one kind of box or the detent in the other kind—and an electro-magnet and its armature that constitutes or is provided with an obstruction that locks and releases and thereby governs the said engaging device in such manner that if the circuit is broken when or immediately after the outer box-door is open to give access to the pull the said pull cannot engage the controlling device or winding-arm,

and consequently can have no effect on the box movement, which cannot be operated until the circuit has become closed and the box-door subsequently opened. This result is accomplished by a movable engaging device on the winding-arm of the motor, which engaging device is controlled as to its movements by the armature of an electro-magnet, and is also controlled by the door of the box. The said engaging device is locked by the armature of the said magnet when energized, in position to be engaged by the pull of the box, but is removed by the action of a spring from position to be engaged by the pull the moment the said magnet is demagnetized, when the box-door is opened and being restored to its position to be engaged by the pull only by closing the box-door, and being retained in this position only when the magnet remains energized after the box-door is opened.

The invention also consists in details of construction hereinafter specified.

Signal-boxes have been made, as illustrated in Patent No. 223,218, dated January 6, 1880, in which the action of the pull on the detent-lever of a normally-wound box is governed by an engaging device controlled by an electro-magnet; but such device differs from that of the present invention when applied to a detent, in that the said patented device was moved both ways by the magnet-armature, while in the present invention the engaging device is not moved by the armature, but is merely held by the said armature, under one condition of the magnet, in position to co-operate with the pull, and the moment the condition of the said magnet is changed the engaging device is moved to the position in which it does not co-operate with the pull and the magnet, and its armature is powerless to restore it to its normal position, in which it does co-operate with the pull, and when once released by the magnet the engaging device cannot be made to again co-operate with the pull until restored by some independent restoring device—namely, in this instance, the door of the box.

Figure 1 is a front elevation of a signal box embodying this invention, both inner and outer doors being open and the parts of the movement being in the position occupied when the circuit is closed, so that the box may be op-

erated without interfering with any other signal; Fig. 2, a plan view of the devices that control the operation of the box, on a larger scale, the said devices being shown in full lines in the normal position and in dotted lines in the position occupied when a signal is being transmitted from another box, and the box shown is rendered inoperative; and Fig. 3 shows a modification in which the invention is applied to the detent of a normally-wound box.

The main portion of the box, comprising the main shaft *a*, provided with an actuating weight or spring, *a'*, and a toothed segment, *a''*, connected with the said shaft and engaged by a ratchet, *a'''*, and pawl *a''''*, with a train of wheel-work, *a''''''*, terminating in an escape-wheel, *a''''''''*, may be of any suitable construction, being shown as the same commonly used in signal-boxes of this kind. One of the arbors, as *a''''''''*, of the said train is provided with a break-wheel, (not shown,) which opens and closes the circuit as it revolves in the usual manner, and the controlling device of the box, which device when properly moved will cause the box to transmit its signal, is shown in Fig. 1 as a winding-arm, *b*, fixed upon the main shaft *a*, which arm when turned winds the weight or spring and causes its force to be applied, through the toothed segment *a''* and the ratchet and pawl, to the train of wheel-work, which it actuates in the return movement of the said segment *a''*, produced by the weight or spring when the winding-arm *b* is disengaged from the force by which it was moved to wind the said weight or spring. The said winding-arm *b* is operated by a box-operating device or pull, *c*, on the inner door or plate, *d*, of the box, which is not opened by the person who opens the outer door, *e*, of the box, (see Fig. 2,) in order to operate the pull *c*, in order to cause the box to give a signal. The plate *d* is hung upon hinges or made as a door merely for convenience in affording access to the mechanism of the box for making adjustments or repairs, and is never opened in the normal operation of the box, and the outer door, *e*, of the box is the only part that enters in any way into the operation of the box, and it alone will be hereinafter called the "door." The said operating device or pull *c* is provided with a finger-piece, *c'*, extending through the plate *d*, to be engaged by the operator, and is pivoted concentrically with the main shaft *a*, and is provided with a projection, *c''*, to operate the winding-arm *b*; but instead of engaging directly with the said winding-arm, as commonly practiced, the said projection *c''* acts on the winding-arm through the intervention of an engaging device, *f*, shown as an arm pivoted at *f'* on the winding-arm *b*, and movable from the full to the dotted line position, Fig. 2, being impelled toward the dotted-line position by a spring, *f''*, connected with said arm and engaging a stop-pin, *f'''*, on the winding-arm, which limits the movement of the said engaging device. When the latter is in the

full-line position, Fig. 2, it will be engaged by the projection *c''* if the pull is operated, and will thus cause the motor to be wound and the box to be operated; but when in its dotted-line position it cannot be engaged by the said projection *c''*, and if the pull is then operated it will produce no effect on the winding-arm or box mechanism. The said engaging device is controlled by the armature *h* of an electromagnet, *i*, said armature being provided with a projecting finger, *h'*, which, when the magnet is energized and the armature attracted, engages the end of the engaging-arm *f* and prevents it from moving from the full to the dotted line position, Fig. 2, so that if said magnet remains energized until the pull *c* is moved by the operator the said pull will engage the winding-arm and wind the box-motor; but if the magnet *i* should be demagnetized when the box-door is opened the projection *h'* will move to the dotted-line position, Fig. 2, and permit the engaging device *f* to move to the dotted-line position, so that the winding-arm *b* cannot be operated by the pull *c*, and consequently the box cannot be operated if a signal is being transmitted from any other box or otherwise, over the same circuit, as the transmission of such a signal will cause the magnet *i* to be demagnetized, and when the device *f* has once moved to its dotted-line position the magnet and its armature are powerless to return the said device to its normal position.

In order to restore the engaging device *f* to its normal position, in case it has been released by the projection *h'* when the outer box-door, *e*, is open, and also to prevent the said device from being made inoperative when another signal is transmitted, but no attempt is made to break in upon such signal, the said engaging device is provided with a contact-piece, *f''''*, in position to be engaged by a projection, *e''*, on the outer door, *e*, of the box, which projection passes through an opening, *d''*, in the inner door when the outer door is closed, and bears on the part *f''''*, so as to restore the device *f* to its normal full-line position, Fig. 2, and retain it there as long as the outer box is closed, irrespective of the position of the armature *h* and projection *h'*.

The plate *f''''* may be made somewhat yielding, so as not to require accurate adjustment of the length of the pin *e''*, and it is preferably extended sufficiently to have some portion opposite the pin *e''*, in whatever position the winding-arm *b* may be, so that if the outer door is closed immediately after the pull is operated the projection *e''* will properly engage the said part *f''''* without interfering with the movement of the arm *b*. The end of the projection *h'* is also curved or cam-shaped, as shown, so that in case the arm *b* should come back to its normal position while the box-door is open and the device *f* in its dotted-line position, the said arm will not be arrested by the projection *h'*, although the magnet *h* might at this time be energized, but will

wedge the said projection aside, retracting the armature, if need be.

As the pull c is accessible to the operator only when the outer door, e , is open, the engaging device f is at such time under control of the magnet and its armature alone, and the said projection e' on the door is only for preventing movement of the device f when the box is not opened, or for restoring the engaging device f to its normal position in case it has been released by the armature when the operator opens the box; and it will be seen that if the engaging device f comes to its dotted-line position when the outer door is open, it cannot be restored and the box cannot be operated until the outer door is closed and the magnet energized and retained energized after the outer door is again opened, and only when these conditions are fulfilled can the box be operated to transmit its signal.

If the engaging device f is in its normal position when the pull is operated, the pressure between the said pull and engaging device is sufficient to retain them in engagement during the entire movement of the winding-arm b ; but the moment the pull is released and returned to its normal position the engaging device moves to its dotted-line position, so that the pull cannot again engage it until the winding-arm has come back to its normal position and the outer door been closed, so that an operator cannot break in upon a signal that is being transmitted from the box that has just been operated.

Fig. 3 represents an engaging device co-operating with a pull and detent lever that constitutes the box-controlling device, instead of the winding-arm represented in Fig. 1, and it also represents a somewhat modified mechanical construction which might be adopted with a winding-arm or detent, if desired. In this construction the detent b^{10} is of the usual kind, engaging by a notch with a pin, b^{12} , on one of the wheels, a^{10} , of the break-wheel-motor train, the said detent being raised to disengage the pin by the pull or operating device c^{10} , which, however, cannot engage directly with the detent b^{10} , but only through the co-operation of the engaging device f^{10} , shown in this instance as having a sliding movement on the detent b^{10} , by which its end may project over, so as to be engaged by the pull c^{10} , or may be drawn back, so that the pull will not engage it. The said engaging device f^{10} is provided with a cam-shaped contact part, f^{40} , engaged by a projection on the door, (not shown,) which will move the device f^{10} into position to be engaged by the pull c^{10} when the door is closed, and retain it in this position as long as the box-door remains closed. The device f^{10} is also provided with a projection, f^{50} , which may be engaged by a projecting portion, h^{10} , of the armature-lever of the controlling-magnet i^{10} . Thus if said magnet is energized when the box-door is open it will retain the

engaging device f^{10} in position to be engaged by the pull, so as to operate the detent; but if the said magnet is demagnetized when or after the door is open the engaging device will be moved by a spring, f^{20} , out of reach of the pull c^{10} , and can only be restored by closing the door of the box. The projection f^{50} in this movement need not pass wholly by the armature-lever h^{10} , which will therefore offer no resistance to the return movement of the engaging device to its normal position.

The present invention is not limited to either kind of controlling device b or b^{10} in the combination with the engaging device controlled by an electro-magnet and also by the door of the box.

I claim—

1. The combination of the winding-arm and the pull or operating device of a signal-box, with a spring-pressed engaging device for said pull and arm, and an electro-magnet and its armature provided with a finger, h' , having an inclined or beveled end that constitutes an obstruction by which the said engaging device is locked in operative position, substantially as described.

2. In a signal-box, the combination of the motor and its controlling device with a pull or operating device, and the spring-pressed engaging device co-operating with the said controlling device and pull, an electro-magnet and its armature provided with an obstruction that locks the said engaging device against the action of its spring in position to engage the pull and controlling device of the box, and the box-door having a portion that operates the said engaging device, substantially as described.

3. The combination of the motor and its controlling device with an engaging device connected with said controlling device and movable thereon, an electro-magnet and its armature provided with an obstruction that locks and releases the said engaging device, as described, and a contact-piece connected with said engaging device, and the door of the box co-operating therewith, whereby said engaging device is restored to and retained in its normal position when the box-door is closed, substantially as described.

4. The combination, with the motor and its winding arm, and engaging device connected with and movable on said arm, and the pull co-operating with said engaging device, of an electro-magnet and its armature provided with a cam-shaped projection co-operating with said engaging device, 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:

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