(No Model.) 3 Sheets—Sheet 1.

F. W. COLE.

SUCCESSIVE NON-INTERFERENCE SIGNAL BOX.

No. 445,795. Patented Feb. 3, 1891.

Fig. 1.

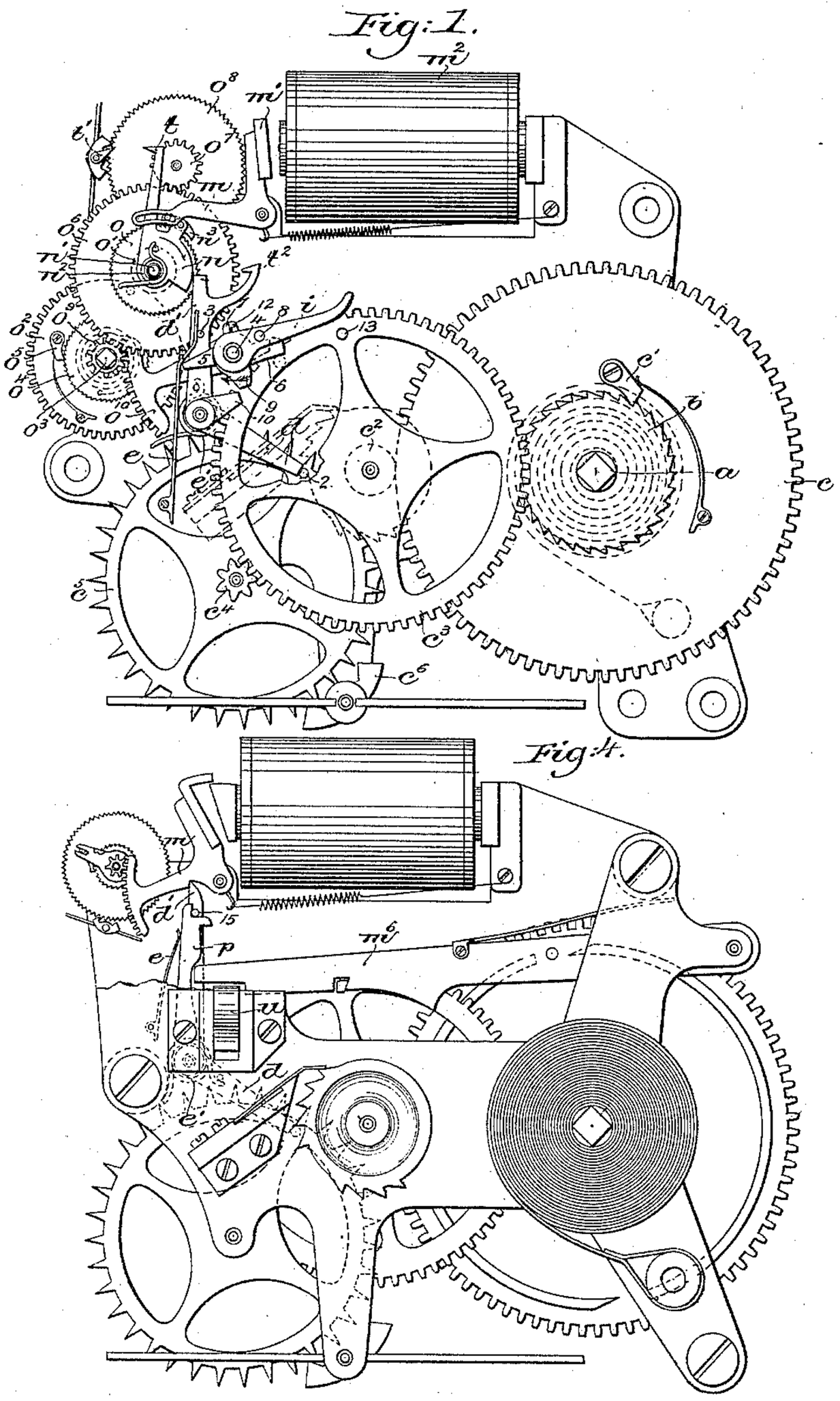

Fig. 4.

Witnesses.
Frederick L. Emmy
Edgar Aladdin

Inventor.
Frederick W. Cole,
by Crosby & Gregory
Attys

(No Model.) 3 Sheets—Sheet 2.

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Fig 6

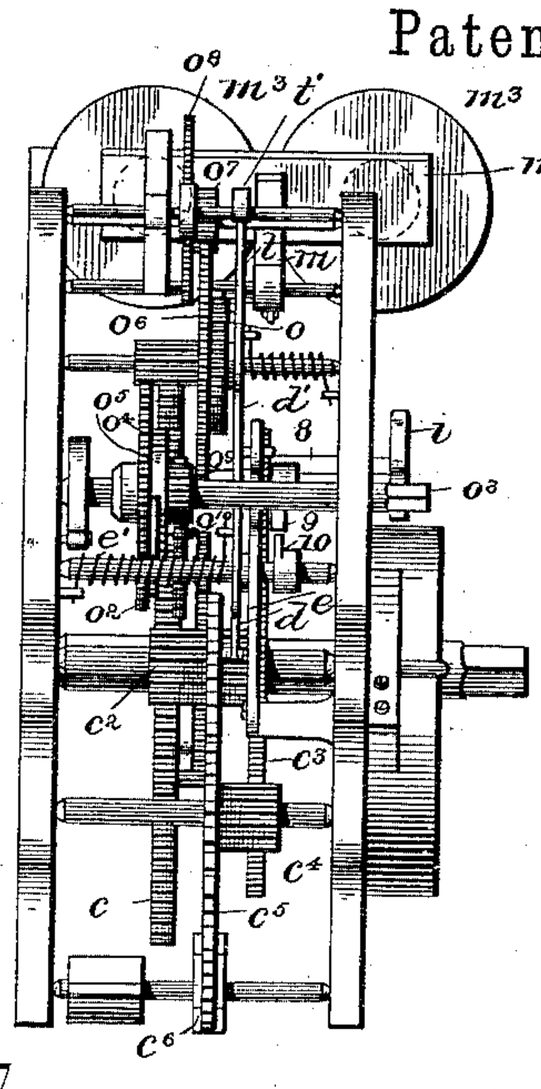


Fig 7

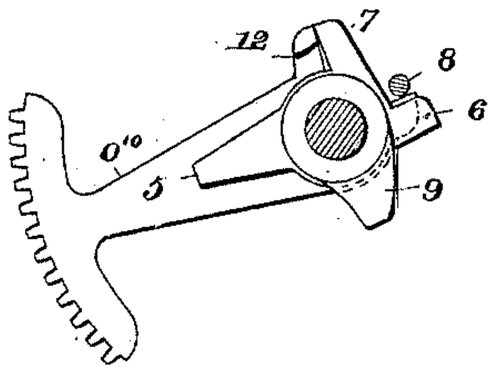


Fig 2

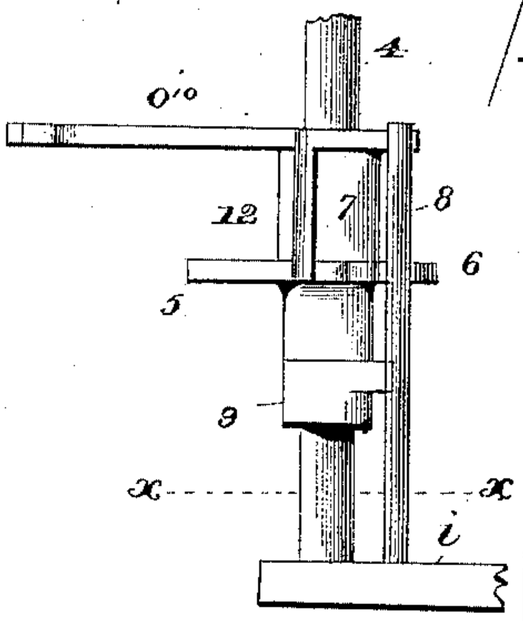


Fig 9

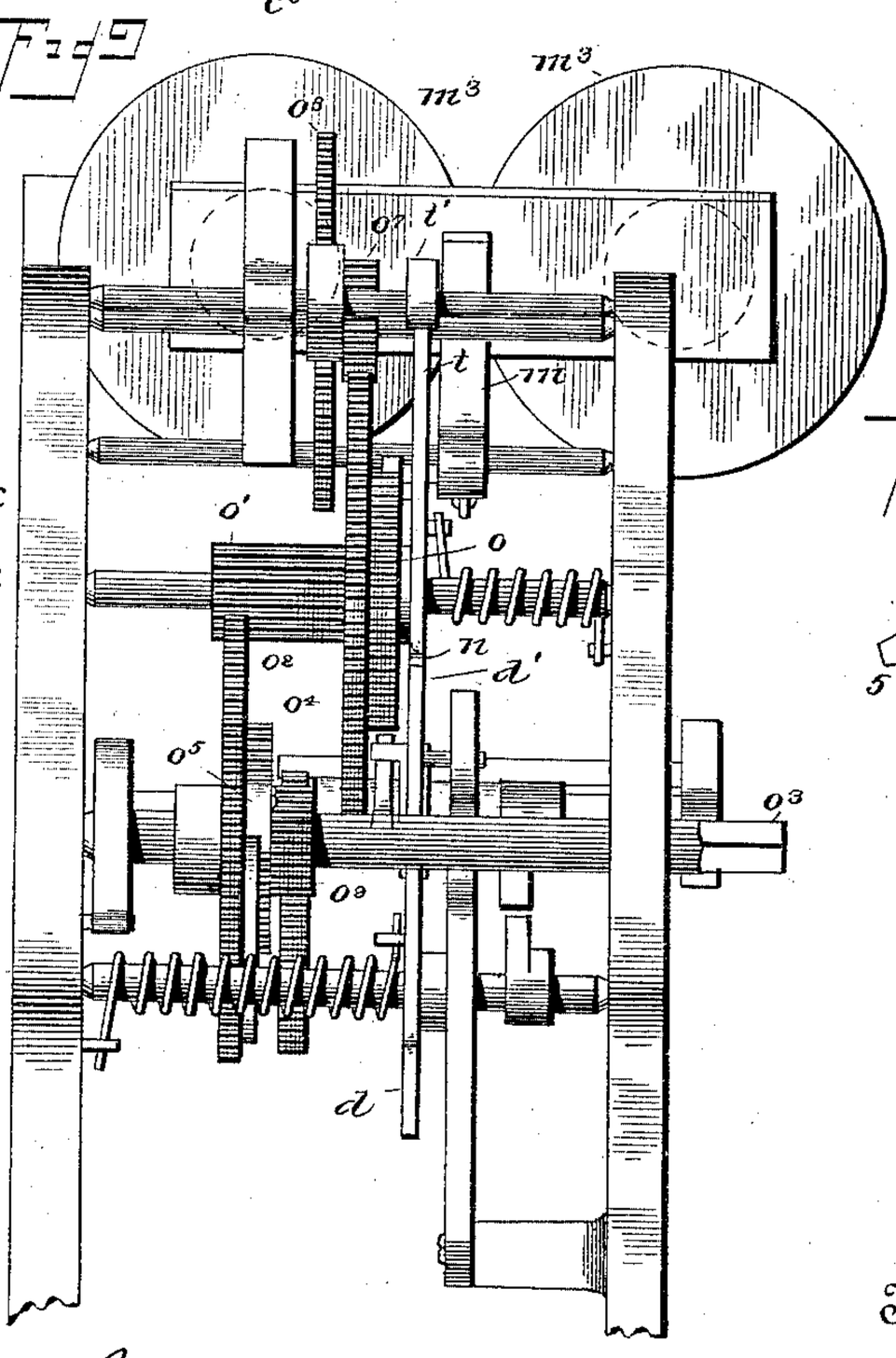
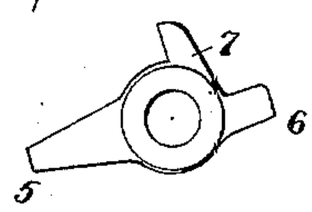


Fig 8



Witnesses
John Semmie Jr
John L. Edwards.

Inventor
Frederick W. Cole,
by Crosby & Gregory,
Attorneys.

(No Model.) 3 Sheets—Sheet 3.

F. W. COLE.

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Fig: 5.

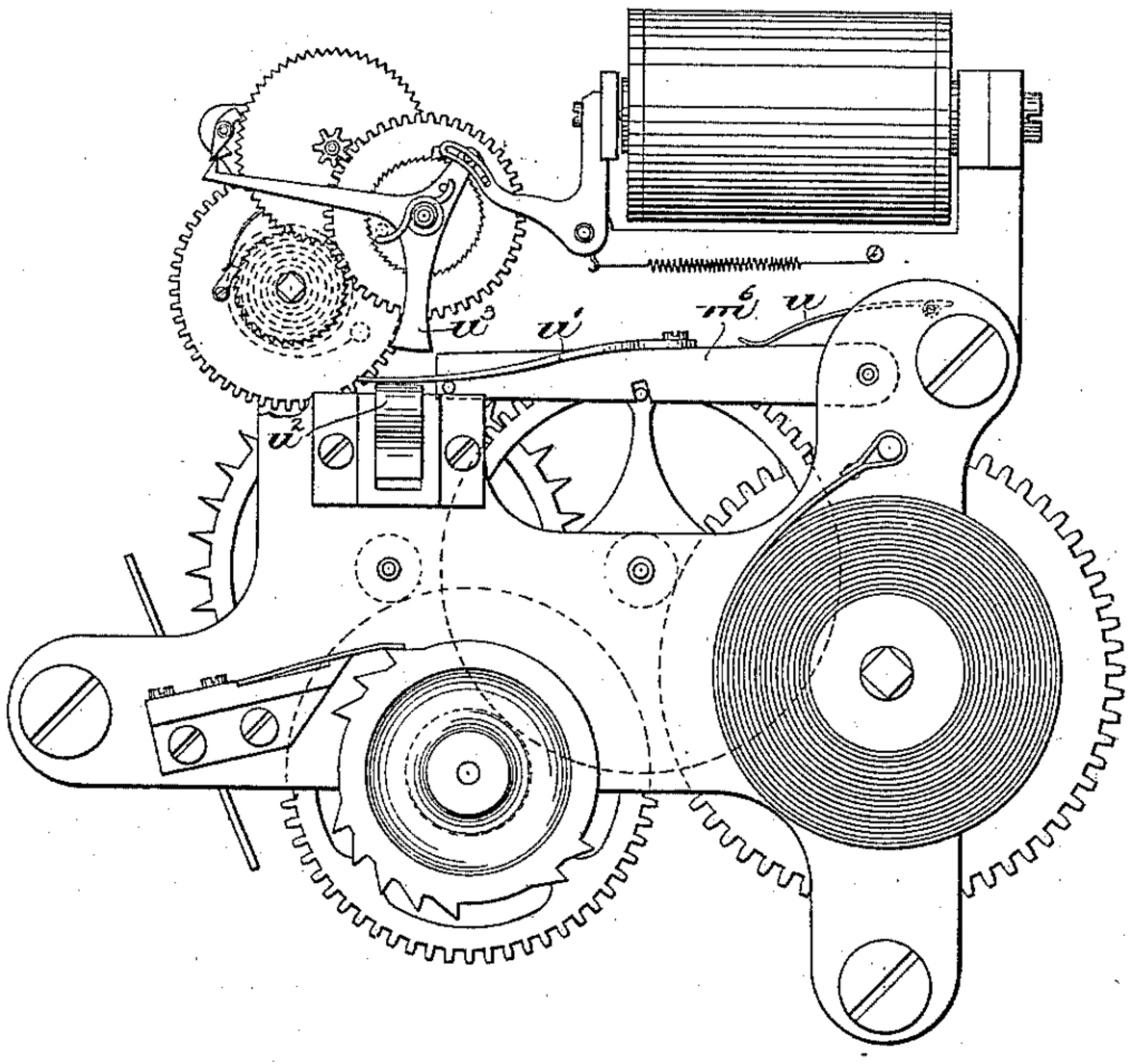
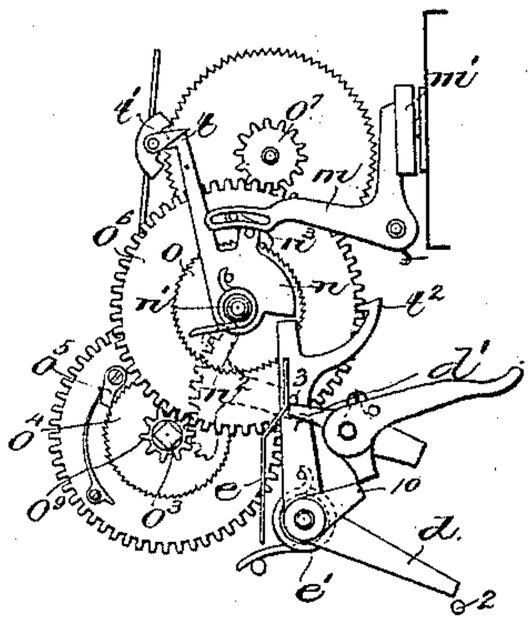


Fig: 3.



Witnesses.
Frederick L. Emmy-
Edgar A. Goddin.

Inventor.
Frederick W. Cole,
by Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

FREDERICK W. COLE, OF NEWTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO MOSES G. CRANE, OF SAME PLACE.

SUCCESSIVE NON-INTERFERENCE SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 445,795, dated February 3, 1891.

Application filed November 22, 1889. Serial No. 331,192. (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 Successive Non-Interference Signal-Boxes, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the construction of non-interference signal-boxes, the production of a "successive" box being the essential feature.

In accordance with this invention the signaling mechanism may be of any well-known or suitable construction. Means are employed for holding the signaling mechanism in its normal or fixed position. A clog, stop, or holdfast is arranged adjacent to one of the parts or members of the means employed for holding the signaling mechanism, which clog is moved in one direction by a time-train or motor mechanism and in the opposite direction by a spring or equivalent. The movement of the clog is under the control of the non-interference magnet in such a manner that when a signal is being transmitted from another box in the circuit the non-interference clog will be so placed as to hold the signaling mechanism of the box containing it in abeyance if it should be operated at such time; but when the line is clear the said clog is in position to permit the said signaling mechanism to operate. A time-train is arranged to be wound up by a key or by means controlled or actuated by the actuating or operating lever or pull of the box, or it may be otherwise wound.

As herein represented, a normally-wound signaling mechanism is shown; but so far as the present invention consists any form or construction may be employed.

Figure 1 shows in front elevation one form of signaling mechanism to which the invention herein to be described is applied; Figs. 2 and 3, details to be referred to; Fig. 4, a view similar to Fig. 1, showing a modification of my invention; Fig 5, another modification. Fig. 6 is a left-hand end view of Fig. 1. Fig. 7 is an under side view of Fig. 2 on the line $x\,x$. Fig. 8 is a similar view of the plate carrying the projections 5 6 7. Fig. 9 is an enlarged view of the upper portion of Fig. 6.

Referring to Fig. 1, the signaling mechanism proper consists of a winding-arbor a, having arranged on it a mainspring, a ratchet-wheel b, and a toothed driving-wheel c, the said wheel c carrying a pawl c', which engages the ratchet-wheel, a toothed wheel c, which meshes with a pinion c^2, fixed to a shaft carrying a toothed wheel c^3, which latter meshes with a pinion c^4, fixed to a shaft carrying the escape-wheel c^5, with which co-operates a suitable pallet c^6. The train of mechanism thus described is held normally wound by a let-off or controlling-lever, one arm, as d, of which obstructs the path of a stop-pin 2 on the escape-wheel. The said let-off or controlling-lever is held in position to hold the train fast by means of a spring e, which bears against a pin 3 on the other arm d' of the said let-off or controlling-lever.

The let-off or controlling-lever is moved out of its position to hold fast the train by means of a spring e', which is weaker than the spring e, so that it is held under tension until such time as the stronger spring e may be removed.

A block or plate is arranged loosely on a stud 4, having, as herein shown, three projections 5 6 7, the projection 5 being arranged adjacent to the spring e, so that when the said plate is moved on the stud 4 in the direction of the arrow it will act to move and hold the said spring e away from the said pin 3 of the let-off or controlling-lever. The actuating-lever i, having a spring (not shown) holding it in normal or elevated position, is also arranged on the stud 4, it having projecting from it at one side a pin 8, which overlies the projection 6 of the block or plate, so that as the actuating-lever i is depressed the pin 8, bearing on the projection 6, will turn said plate on the stud 4 in the direction of the arrow. A projection 9 is arranged on the actuating-lever i, which as the actuating-lever is depressed passes over a projection 10 on the let-off or controlling-lever, so as to hold the said let-off or controlling-lever at rest during the time the actuating-lever is being depressed

and the arm 5 is being moved into position to relieve the said controlling-lever of the pressure of the spring *e*. As soon, however, as the lever *i* has been restored to its normal position and the projection 9 has passed by the end of the arm 10 the controlling-lever is moved by the spring *e'*, as the projection 5 still holds the spring *e* away.

A clog or holdfast for the let-off or controlling-lever is shown at *n*, it being loosely mounted on a shaft *n'*. A spring n^2 is also arranged on said shaft, one end of which is secured to or presses against said clog, and the other end is secured to or presses against a pin arranged on the frame-work and shown in dotted lines, the tendency of the spring being to throw the clog rearwardly in the direction of the arrow thereon. The clog *n* occupies a position (see detail, Fig. 3) permitting a free and unobstructed movement of the let-off or controlling-lever in a direction to release the mechanism; but when in its other position (see Fig. 1) the movement of the let-off or controlling-lever is prevented. A pawl n^3 is loosely arranged on the clog *n*, which is connected by a pin-and-slot connection with the lever *m*, carrying the armature *m'* of the non-interference magnet m^2. The lever *m* moves the pawl n^3 into and out of engagement with the ratchet-wheel *o*, secured to the shaft *n'*. A pinion *o'* (see dotted lines) is also secured to the shaft *n'*, which is engaged by a toothed wheel o^2, arranged loosely on the winding-arbor o^3. A ratchet-wheel o^4 is secured to said winding-arbor o^3, which is engaged by a pawl o^5, carried by the toothed wheel o^2. A mainspring is also arranged on the winding-arbor o^3 in any usual manner. A toothed wheel o^6 is also secured to the shaft *n'*, which engages a pinion o^7, secured to a shaft carrying an escape-wheel o^8. This last-named train of gears constitutes a time-train which may be wound up by a key engaging the square end of the winding-arbor, or, if desired, a pinion, as o^9, may be placed on said arbor, which may be engaged by a sector o^{10}, mounted loosely on the stud 4, the rear end of the arm of the sector being engaged by the pin 8 on the actuating arm or lever, or, so far as the present invention is concerned, it may be wound in any other usual manner.

The clog *n* bears a dog *t*, which engages a detent *t'* when said clog is in the position shown in Fig. 3, and while there serves to hold fast the train; but when said clog *n'* is moved into the position shown in Fig. 1 the non-interference train is released and, unless otherwise prevented, will start up. I have, however, shown a dog t^2 on the lever *d'*, which engages and disengages the wheel o^6 of the time-train. As shown, the dog t^2 will engage the wheel o^6 when the controlling-lever has been moved to release the signaling-train, so as to hold the non-interference train at rest at such time.

With the parts in their normal position and the door of the box open ready for a signal to be transmitted the armature *m'* will be attracted, the clog *n* will be as shown in Fig. 3, and as the actuating-lever is depressed the let-off or controlling-lever *d d'* will be moved to start the mechanism; but if a signal from another box is being transmitted the armature *m'* will be retracted, as shown in Fig. 1, and as it is retracted the lever *m* causes the pawl n^3 to disengage the ratchet-wheel *o*, and as soon as such disengagement is effected the clog *n* will by means of the spring n^2 be moved into the position shown in Fig. 1. With the parts in this position, if the actuating-lever is depressed, the spring *e* will be moved away from the arm *d'* and held by means of the plate 5 6 until said plate is moved back into its normal position. The plate 5 6 thus remaining in position to hold the spring *e* away from the let-off or controlling-lever, the latter will release or set free or start the mechanism just as soon as the clog *n* is moved out of the way. As soon as the line is clear the armature *m'* will be attracted and the pawl n^3 will again engage the ratchet-wheel, and as the train driving it is running the clog *n* is soon driven back into its normal position, when its dog *t* stops the said train. The let-off or controlling-lever is then free to operate.

To provide against the signaling mechanism being held by the let-off a long time after the pull has been operated, I have arranged a projection 12 on the arm of the sector o^{10}, which as soon as the said sector arrives at its normal position strikes the projection 7 of the plate 5 6 7 and returns the latter to its normal position, thereby permitting the spring *e* to resume its normal position, thus preventing the signaling mechanism from operating until the box has been pulled again, the advantage being that if a signal could not be sent in when wanted, as in the case of a line being down, it would not come in at any other time afterward and give a false alarm, as when the line was again repaired, it being perhaps several hours afterward. If, however, the signal is transmitted, the pin 13 on the toothed wheel c^3, just before the latter makes one complete rotation, strikes the arm 6 of the plate 5 6 7 and returns the plate to its normal position, allowing the spring *e* to move the locking-lever to stop the signaling-train.

The signaling mechanism thus described is successive—that is to say, if the line is clear it will transmit its signal when operated; but if the line is not clear it will wait until such time arrives, and the signal will then be transmitted without the necessity of a second time moving the actuating lever or arm.

The time-train or motor mechanism employed for controlling the movement of the let-off or controlling-lever may vary materially in construction, many forms being common. So I do not desire to limit myself to any particular form; also, it will be seen that pressure on the let-off or controlling-lever is released by means of the actuating-lever, and

the said let-off or controlling-lever can move as soon as the clog permits it to do so.

Referring to Fig. 4, the let-off or controlling-lever $d\ d'$ is shown arranged to set free a normally-wound-up train, as in Fig. 1. A spring e bears against an arm p, which in turn bears against a pin 15 on the let-off or controlling-lever. The arm d' is moved or set free by means of a spring e'. (See dotted lines.) The same arm d' of the let-off or controlling-lever engages the armature-lever m.

The signaling mechanism is provided with a common form of starting-lever m^6, which is pivoted to the frame-work, one end of which, when raised by means of the actuating-pull throws the arm p away from the let-off or controlling-lever against the tension of the spring e, so that the spring e' can act. In this instance the let-off or controlling-lever engages a shoulder formed on an arm m, which is moved by the armature of the non-interference magnet and by said arm is held. In lieu, however, of the time-train shown in Fig. 1, a simple form of retarding device or train is shown, comprising a section on the arm m, a pinion, pawl and ratchet, an escape-wheel, and fan.

In lieu of the let-off or controlling-lever herein shown, I may employ any form of locking-lever by which the signaling mechanism is positively held.

Referring to Fig. 5, a signaling-train is shown having a starting-lever m^6, held down by a weak spring u. A stronger spring u' is attached to the starting-lever, against which the pull u^2 bears. A clog u^3 is arranged above the starting-lever m^6, carried by a member, the position of which is controlled by the armature of the non-interference magnet, similar to that described in Fig. 1. When the clog is in a position directly over the starting-lever, the latter cannot be lifted; but the pull may raise the spring u'.

I claim—

1. In a signal-box, signaling mechanism and actuating devices therefor, comprising a controlling-lever, signaling-lever, and co-operating parts whereby the signaling mechanism may be set in condition to operate whenever the signaling-lever is operated, combined with a clog which when in one position prevents movement of the controlling-lever and when in its other position permits movement of said controlling-lever, and a non-interference magnet and its armature, the latter controlling the position of said clog, substantially as described.

2. In a signal-box, signaling mechanism and actuating devices therefor, comprising a controlling-lever, signaling-lever, and co-operating parts whereby the signaling mechanism may be set in condition to operate whenever the signaling-lever is operated, combined with a clog which when in one position prevents movement of the controlling-lever and when in its other position permits movement of said controlling-lever, a non-interference magnet and its armature, and a time-train for moving said clog in one direction, its operative connection with said time-train being controlled by said armature, substantially as described.

3. In a signal-box, the signaling mechanism, controlling-lever for it, means for moving the controlling-lever, and a clog arranged to enter the path of movement of the said controlling-lever, combined with a spring for moving said clog in one direction and a time-train for restoring said clog to its normal position, and a non-interference magnet and its armature, the latter controlling the operative connection of the clog and time-train, substantially as described.

4. In a signal-box, the signaling mechanism, controlling-lever for it, and a clog which when in one position holds the controlling-lever fast and when in its other position permits movement of the controlling-lever, combined with a time-train for moving the clog in one direction and a spring for moving it in the opposite direction, and a non-interference magnet and its armature, the latter controlling the operative connection of the clog with the time-train, substantially as described.

5. In a signal-box, the signaling mechanism, a controlling-lever for it, a clog for said controlling-lever, and a non-interference magnet and its armature, the latter controlling the position of the said clog, combined with a plate for releasing the locking-pressure on the controlling-lever and means, substantially as described, for moving said plate, substantially as and for the purpose set forth.

6. In a signal-box, the signaling mechanism, a controlling-lever for it, and a weak spring for moving said controlling-lever, combined with a strong spring for holding said let-off or controlling-lever in its normal position against the tension of the weak spring and means, substantially as described, for moving said strong spring to relieve the pressure, substantially as set forth.

7. In a signal-box, signaling mechanism and a controlling-lever for it, a spring for moving it in one direction, and another spring for holding it against the tension of the first-named spring, combined with a non-interference clog for said spring-actuated controlling-lever and a time-train for said clog, substantially as described.

8. In a signal-box, signaling mechanism and a spring-actuated controlling-lever for it, combined with a plate for releasing the pressure of said controlling-lever, means, substantially as described, for restoring said plate to its normal position, and a signaling-lever, substantially as described.

9. In a non-interference signal-box, a signaling-train, a controlling-lever for it, and an actuating-spring for the controlling-lever, combined with an independent time-train, which when running holds the controlling-lever against the force of its actuating-spring, and a non-interference magnet and its arma-

ture separate from the controlling-lever, controlling the operation of said time-train, substantially as described.

10. In a signal-box, signaling mechanism and a spring-actuating controlling-lever for it, means for holding it against the tension of its actuating-spring, and a movable plate by which the controlling-lever is placed under the influence of its actuating-spring to thereby set the signaling mechanism in condition to operate, combined with an independent motor mechanism and means moved by it for restoring the said plate to its normal position after a predetermined length of time, substantially as described.

11. In a signal-box, signaling mechanism, a controlling-lever for it, means for holding the controlling-lever in its normal position, a plate for effecting movement of the said controlling-lever, and a clog for controlling the movement of said controlling-lever, combined with a non-interference train with which the said clog is operatively connected and means, as a pin, for restoring said plate to its normal position after a predetermined length of time, substantially as described.

12. In a signal-box, signaling mechanism, a controlling-lever for it, means for holding the said controlling-lever in its normal position, and the projection 10 on the controlling-lever, combined with the signaling-lever having the projection 9 on it and the plate 5 6, moved by the signaling-lever and restored by the train, substantially as described.

13. In a signal-box, signaling mechanism, a controlling-lever for it, and a spring for holding the controlling-lever in its normal position, combined with the plate 5 6, adapted to remain in whatever position it may be placed, for moving said spring to release the controlling-lever, the signaling-lever for moving the said plate in one direction, and means for restoring said plate to its normal position, substantially as described.

14. In a signal-box, signaling mechanism, a controlling-lever for it, and means for holding the controlling-lever in its normal position, combined with the plate 5 6 7, a signaling-lever for moving it in one direction, that the controlling-lever may assume its abnormal position, a pin carried on one of the moving parts of the train for restoring said plate to its normal position, a non-interference train, magnet, and armature, and a pin carried by said non-interference train for also restoring said plate to its normal position, substantially as described.

15. In a successive non-interference signal-box, a signaling-train, a signaling-lever, an independent time-train, and a non-interference magnet and its armature controlling the operation of said independent train, combined with a controlling-lever having a dog t^2 thereon and interposed between the signaling and independent trains, the dog locking and preventing the independent train from running unnecessarily when the signaling-train is released by the movement of said lever out of engagement therewith, substantially as described.

16. In a signal-box, signaling mechanism, a controlling-lever for it, and means for holding said controlling-lever in normal position, combined with a plate for effecting movement of said controlling-lever, a pin carried by one of the wheels of the train for restoring said plate to its normal position, and a signaling-lever in the path of movement of which the plate continually lies, substantially as described.

17. In a signal-box, a signaling-train, a controlling-lever which normally holds the train at rest, a spring for moving it to release the train, and a signaling-lever governing the operation of the actuating-spring of the controlling-lever, combined with an independent time-train governing the movement of said controlling-lever to allow the train to operate and a non-interference magnet and its armature for governing the operation of said time-train, substantially as described.

18. In a signal-box, a signaling-train and a signaling-lever for placing it under the control of its main or actuating spring, combined with an independent time-train, an independent controlling-lever for holding the signaling-train after the signaling-lever has been operated, said controlling-lever being governed by said independent time-train, and a non-interference magnet and its armature controlling the operation of said independent time-train, substantially as described.

19. In a signal-box, a signaling-train, a locking-lever for it, and a signaling-lever for placing the signaling-train directly under the control of said locking-lever, combined with an independent time-train controlling the movement of said locking-lever and a non-interference magnet and its armature controlling the return of said independent time-train, 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:
BERNICE J. NOYES,
E. J. BENNETT.