(No Model.) 2 Sheets—Sheet 1.

W. E. DECROW.

SUCCESSIVE NON-INTERFERENCE SIGNAL BOX.

No. 486,702. Patented Nov. 22, 1892.

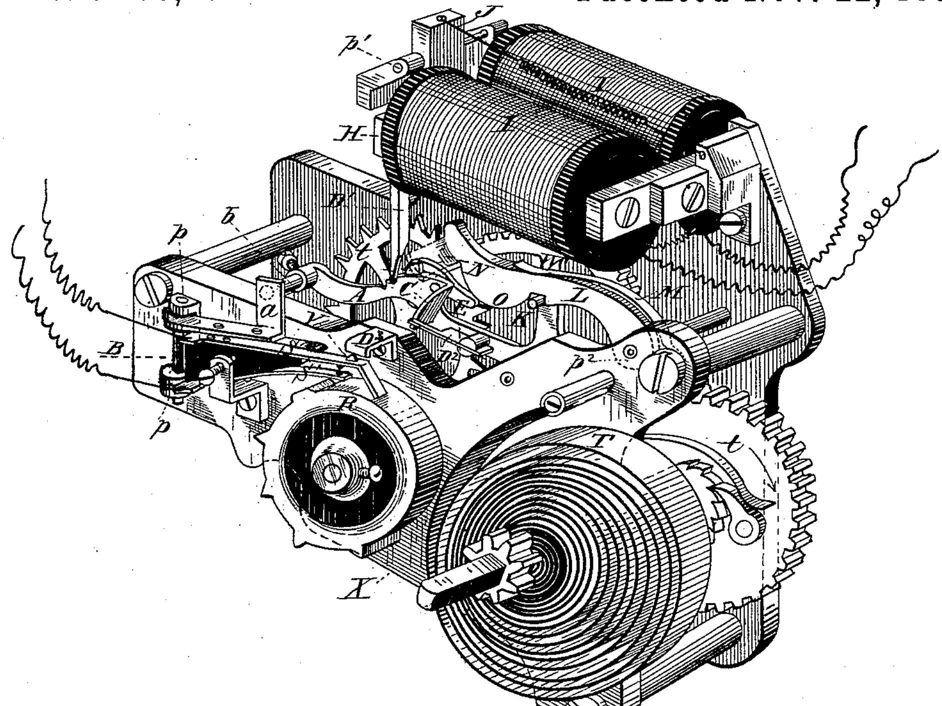

Fig. 1.

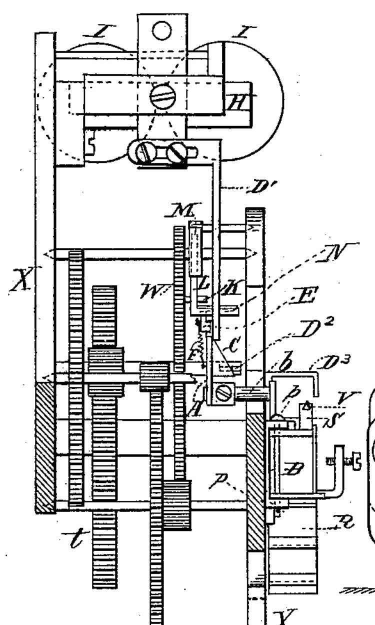

Fig. 3.

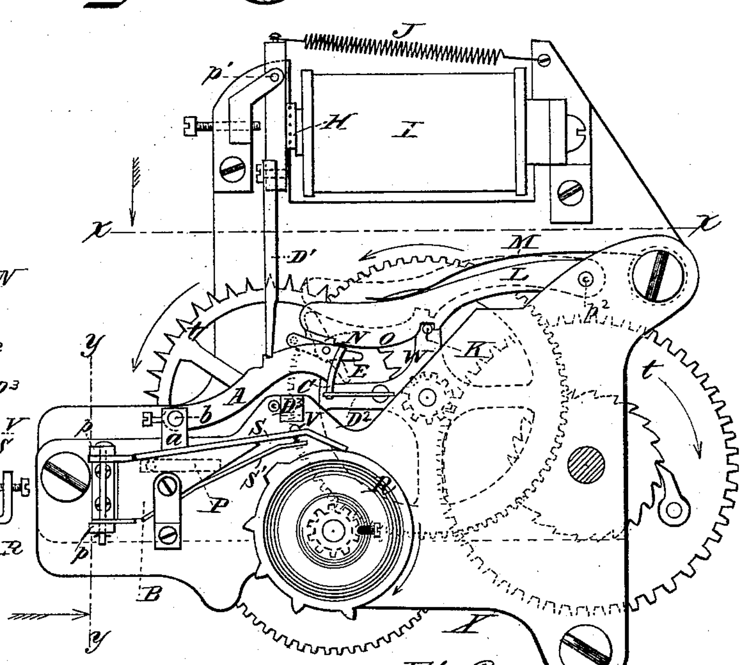

Fig. 2.

Witnesses:
David Hall Rice
C. F. C. Meech.

Inventor:
William E. Decrow
by Stanton Day Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. E. DECROW.

SUCCESSIVE NON-INTERFERENCE SIGNAL BOX.

No. 486,702. Patented Nov. 22, 1892.

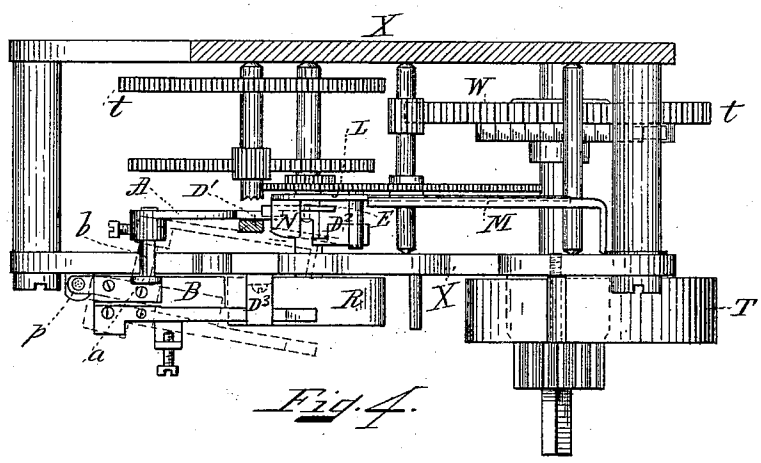

Fig. 4.

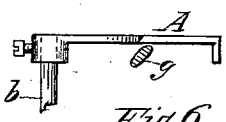

Fig. 6.

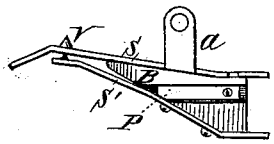

Fig. 5.

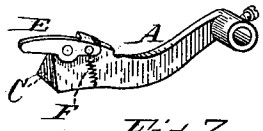

Fig. 7.

Witnesses.
David Hall Rice
L. F. C. Meech.

Inventor.
William E. Decrow
by Stanton Day Atty.

UNITED STATES PATENT OFFICE.

WILLIAM E. DECROW, OF BOSTON, MASSACHUSETTS.

SUCCESSIVE NON-INTERFERENCE SIGNAL BOX.

SPECIFICATION forming part of Letters Patent No. 486,702, dated November 22, 1892.

Application filed July 25, 1890. Serial No. 359,949. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. DECROW, of Boston, county of Suffolk, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Successive Non-Interference Signal Boxes, of which the following description, together with the accompanying drawings, is a specification.

My invention relates to electric signal-boxes which by mechanically making and breaking an electric circuit transmit a signal.

My invention consists of devices by means of which if one or more boxes are released while another box or boxes in the same electric circuit are liberated there will be no confusion and the boxes liberated will send in their signals successively.

In general the invention consists of a mechanical disabling device for rendering the apparatus inoperative and certain detents for holding this disabling device, so that the apparatus will be in operative condition at all times except when the box is pulled when an interfering-signal is on the line, while by the same arrangement I provide that the box will be automatically restored to its operative condition and its own signal sent on the termination of the interfering-signal. I accomplish this result by devices so constructed and so placed in relation to the circuit-breaking wheel and certain detents that breaking the circuit at a distant point and starting the train will remove the circuit-key from the path of the circuit-breaking wheel, detaining it outside the path until by the continued movement of the train the circuit-key is restored or reset to the path of the circuit-breaking wheel by a part attached to the train, when if the circuit is no longer being broken from a distant point the number of the box will come in.

Figure 1 is a perspective view of the mechanism of a box embodying my invention. Figs. 2 and 3 are respectively side and end elevations of the same. Fig. 4 is a plan view, and Figs. 5, 6, and 7 illustrate details.

The same letters of reference designate the same parts in all of the figures.

To the frame X of a fire-alarm signal-box of ordinary construction and carrying a train of wheels *t*, actuated by a spring T, I pivot at *p* a rocking lever or arm B, to which are attached the springs S and S′, forming a key-break of familiar form, and to which, by means of the angle-piece *a* and the stud or shaft *b*, I attach an arm A, provided with the incline plane C and the trip-cam E, held in position by its spring F, all parts being properly insulated. The rocking lever B, carrying the springs S and S′, and the arm A, rigidly attached to it by the angle-piece *a* and the stud or shaft *b*, form one acting part, which is constructed, as shown, to present convenient points of engagement with the detents D′ and D^2.

To the armature H of an electro-magnet I in the circuit I attach arm or detent D′, pivoted at *p*′, capable of engaging and disengaging with the arm A, its position being governed by the presence or absence of current in the magnet I, which overcomes the pull of the spring J.

To the wheel W in the train I attach the pin K, capable of engaging with a notch in the lever L when the same is in its path, and also the detent D^2, capable of being brought into engagement both with the incline C and the trip-cam E by the revolution of the wheel W.

I provide the stop-lever L (pivoted at p^2 and impelled by its spring M to engage with the pin K) with the flange N, with which the trip-cam E engages whenever the said cam is itself engaged and lifted by the detent D^2.

Spring P (shown in Figs. 2 and 5) tends to move the rocking lever B and attached springs S and S′ out of the path of the circuit-breaking wheel R when not prevented by the engagement with the rocking lever B and the parts attached thereto of one or more of the detents D′, D^2, and D^3. The flanged detent D^3 is attached to the frame X in a position to engage with the projection V on the spring S when the same rides up on the teeth of the circuit-wheel R of ordinary construction.

The action of my machine is as follows when it is placed in an electric circuit: First, if the circuit is broken from a distant point and the train is not liberated the magnet I is de-energized and armature-detent D′ is disengaged from arm A by the action of spring J; but the engagement of detent D^2 with the incline C detains the rocking lever B and holds the springs S S′ in the path of the circuit-

breaking wheel R; second, if the train is liberated in the usual manner when the circuit is closed—*i. e.*, when my improved box is pulled and the line is free—detent D^2, moving with the wheel W, passes off the incline C; but detent D′ is still in engagement with the arm A until by the revolution of the circuit-breaking wheel R a tooth thereon raises the spring S from the spring S′, breaks the circuit, and detent D′ is disengaged from the arm A by the action of spring J; but the projection V on the spring S has now moved under the detent D^3. Thus spring S is held in the path of the circuit-wheel R during the disengagement of detent D′ consequent upon breaking the circuit. When the spring S falls from the tooth of the circuit-breaking wheel R, it closes the circuit by contact with spring S′, and the detent D′ re-engages arm A by the action of the magnet on its armature, overcoming the action of spring J before the projection V has moved out of engagement with detent D^3; third, if the train is liberated (my box is pulled) while the circuit is being broken at a distant point (another box is operating) detent D^2 becomes disengaged from incline C by the movement of the train to which it is attached and detent D′ moves out of engagement with arm A by the action of spring J, as above described. Because of the break in the circuit detent D^3 cannot engage projection V, because the teeth of the circuit-breaking wheel R have not lifted spring S into a position of possible engagement, as the break in the circuit must occur before a tooth reaches the spring S. Spring P therefore is free to act and forces the spring S, carried by the rocking lever B, out of the path of the circuit-breaking wheel R.

It is evident that with the circuit-key, composed of the springs S and S′, removed from the path of the circuit-breaking wheel R the box is electrically inoperative. To enable it to send a signal after the current is restored two things are necessary—first, a restoration of the circuit-key to the path of the circuit-breaking wheel R, and, second, a continued movement of the train for the time necessary to give the signal after the circuit is restored.

I provide arm A with an incline C, with a height equal to its arc of movement. With this incline C the detent D^2 engages as the wheel W revolves and restores rocking lever B to the path of the circuit-breaking wheel. To secure a continued movement of the train, I form detent D^2 to engage with trip-cam E if the circuit-key is out of the path of the circuit-breaking wheel, but not otherwise, and to force it against the action of spring F to engage with flange N, and so move stop-lever L out of the path of pin K. To restore the stop-lever L, I provide it with the incline plane O, with which pin K subsequently engages as the wheel W revolves and lifts the flange N from the trigger E, which will then be restored by its spring F, and stop-lever L will be restored by its spring M to a position of possible engagement with pin K when the wheel W has completed its revolution.

It is obvious that the form of my machine can be much altered without changing the principle of its operation. The construction of the mechanism composed of the lever B, pivoted at *p* and bearing the spring-key composed of two springs S and S′, and also bearing the arm A, attached thereto by the angle-piece *a* and the post *b*, was only adopted to enable it to be readily applied to a familiar form of signal-boxes now in use. It thus appears that the mechanism described illustrates my general invention, the mechanical disabling device consisting of the circuit-key adapted to be thrown into and out of the position where it will be engaged and actuated by the break-wheel, while the detents for said disabling device—three in number—are, first, the armature-lever D′, controlled by the non-interference magnet I; second, the stops D^2, controlled by the train, and third, the bracket D^3, so placed that the circuit-key engages therewith when operated by the break-wheel. It is also clear that the apparatus is automatically brought into operative condition and a signal sent upon the termination of an interfering-signal, or, in other words, is made a "succession-box" by means of the automatic resetter for arm A and automatic releaser for the train, consisting, respectively, of the cam projection C and the trigger E, both of which are engaged by the stop or projection D^2 on the train, whereby the disabling device is automatically reset and the train automatically started on a second round after the interfering-signal has been completed and the line is clear. It will be readily perceived by one skilled in the art that various equivalents for these elements may be employed.

It will be noted that in my apparatus the device is, as I term it, "mechanically disabled" in order that it may not send an interfering-signal. I intend this term to distinguish my apparatus from others in which the device is, it may be said, "electrically disabled." In the one case some part of the mechanism is displaced, (in my device it is the circuit-breaking key,) so that the normal mechanical operation cannot take place. In the other case, however, the mechanism is left in its normal condition and a short circuit is closed around the signaling contact, so that while the device will operate mechanically it will be disabled electrically.

I claim—

1. In a signal apparatus, the combination, with a break-wheel and train, of a mechanical disabling device and three detents therefor, one controlled by a non-interference magnet, one by the train, and the third by the action of the apparatus in sending a signal.

2. In a signal apparatus, the combination, with a mechanical disabling device therefor, of a spring tending to throw said device into a position to disable the apparatus, a detent holding said device against the action of said

spring and controlled by a non-interference magnet, whereby the apparatus will be disabled if an interfering-signal is being sent, a second detent for said device controlled by the train, whereby if the train is started the device will be released, provided no interfering-signal is being sent, and a third detent for said device controlled by the apparatus when in operation, whereby it will not be disabled by its own interruption of the circuit.

3. In a signal apparatus, the combination of a break-wheel, a circuit-key operated by said wheel, but adapted to be spring-pressed out of operative position to disable the apparatus, and three detents for said key, one controlled by a non-interference magnet, one controlled by the train, and the third placed to engage the key when it is operated by the break-wheel.

4. In a signal apparatus, the combination, with the train, of a break-wheel adapted to come into action at a certain period after the train is started, a mechanical disabling device for interrupting the mechanical continuity of the mechanism, and a detent therefor controlled by a non-interference magnet, whereby if the train is started while an interfering-signal is being sent the detent will be removed and the apparatus disabled before the break-wheel comes into action.

5. In a signal apparatus, the combination, with a signal-wheel, its train, a mechanical disabling device, and three detents for said device, as described, of a resetter for said device and a releaser for the train, both operated by the train in running, whereby if the box is started while an interfering-signal is being sent it will be temporarily disabled, but will be automatically restored and a signal sent upon the termination of the interfering-signal.

6. In a signal apparatus, the combination, with a train and break-wheel, of a manual starting device for the train, a non-interference magnet, mechanical disabling device therefor acting to interrupt the mechanical continuity of the mechanism, and detents for said device, controlled by the train and said magnet, respectively, whereby neither alone can disable the apparatus.

7. In a signal apparatus, the combination, with a circuit-key, of a break-wheel therefor, a spring for throwing said key out of its operative position, three detents for said key, controlled, respectively, by the non-interference magnet, the train, and the break-wheel, an automatic resetter for said key, and an automatic releaser for said train.

8. In a signal apparatus, the combination, with a train and break-wheel, of a manual starting device for the train, a non-interference magnet, means for mechanically disabling the apparatus, so that the mechanical continuity of the mechanism is interrupted, in order that the break-wheel shall not act to interrupt the circuit, and detents therefor controlled by the said magnet and train, respectively.

9. In a signal apparatus, the combination, with a train and break-wheel, of a manual starting device therefor, a non-interference magnet, means for mechanically disabling the apparatus, so that the mechanical continuity of the mechanism is interrupted, in order that the break-wheel shall not act to interrupt the circuit, and detents therefor controlled by the said magnet and train, respectively, with a device for preventing the disabling of the apparatus by its own magnet in sending a signal.

10. In a signal apparatus, a break-wheel and train therefor, a non-interference magnet, and contacts in the main line, adapted to be actuated by said wheel and so placed relatively to the wheel as to be mechanically engaged by the wheel or not, according to the position of detents controlled by the train and magnet, respectively.

11. In a signal apparatus, a break-wheel and train therefor, a non-interference magnet, and contacts in the main liue, adapted to be actuated by the said wheel and so placed relatively to the wheel as to be mechanically engaged by the wheel or not, according to the position of the detents controlled by the train and magnet, respectively, means being also provided for preventing the disabling of the apparatus by its own magnet in sending a signal.

12. In a signal apparatus, a break-wheel and train therefor, a non-interference magnet, contacts in the main line, adapted to be actuated by the said wheel, and two detents determining the mechanical engagement of said contacts by the wheel, one detent being controlled definitely by the train and the other controlled by the said magnet.

13. In a signal apparatus, a break-wheel and train therefor, a non-interference magnet, contacts in the main line, adapted to be actuated by the said wheel, and two detents determining the mechanical engagement of said contacts by the wheel, one detent being controlled definitely by the train and the other controlled by the said magnet, means being also provided for preventing the disabling of the apparatus by its own magnet in sending a signal.

WILLIAM E. DECROW.

Witnesses:
GEORGE D. AYERS,
SETH. T. FARNSWORTH.