To all whom it may concern:

Be it known that I, NATHAN H. SUREN, a citizen of the United States, residing at Needham, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Auxiliarized Fire-Alarm Boxes, of which the following is a specification.

This invention relates to auxiliarized fire-alarm boxes, and has for its object to provide a box with improved auxiliary actuating-mechanism for releasing or otherwise operating it; and also improved means, controlled by the signaling-train, for operating the usual circuit-breaker or switch which is included in the auxiliary-circuit; also to provide the box with a single shunt circuit-operating-device, arranged to be operated by means controlled by the opening of the box door, and also by means controlled by the auxiliary actuating-mechanism, whereby the box is included in the signaling-circuit to send its signal when the box door is open, to admit of manual operation of the box, and also when the box is released or otherwise operated automatically by the auxiliary actuating-mechanism.

Figure 1 is a front elevation of an auxiliarized fire-alarm box embodying this invention. Fig. 2 is a detail of the auxiliary actuating-mechanism, the parts being in the position they will occupy when the box is first released. Fig. 3 is a detail of the auxiliary actuating-mechanism, parts being in the position they will occupy a short time after the box has been released. Fig. 4 is a detail of the locking-lever for the signaling-train which may be employed. Fig. 5 is a plan and partial section of the auxiliary actuating-mechanism. Fig. 6 is a side-elevation of the auxiliary actuating-mechanism, and mechanism operated by it. Fig. 7 is a detail of the single shunt circuit-operating device. Fig. 8 is a sectional detail showing the means controlled by the box door for operating the shunt circuit-operating device.

a designates the usual stop-wheel of the train of an ordinary fire-alarm box, having a notched flange a'; e the locking-lever, pivot ed at e', and adapted to be held in engagement with said stop-wheel by a suitable spring e'', and to be lifted for the purpose of disengaging said stop-wheel to release the train; e'' the pull arranged to be operated manually to lift the locking-lever to release the signaling-train to send a signal when the door of the box is open.

The locking-lever e is provided with an extension e'' adapting it to be operated by the auxiliary actuating-mechanism. A flat spring e'' is attached at one end to said locking-lever, the free end of which extends over the edge of the extension e'' and said free end has a normal tendency to move away from the extension e'', when permitted, but is adapted to be pressed into engagement with the edge of said lever by the means employed for moving the lever. The free end of said spring, as here shown, terminates approximately at the end of the extension e''. Said extension e'' and spring e''' extend across the path of movement of a pin i, projecting laterally from a horizontally arranged bar i', adapted to slide longitudinally in suitable bearings, and as said bar is moved in a direction toward the left the spring is pressed against the extension and the extension is moved to lift the locking-lever on its pivot e', thereby to release the signaling-train, and when the pressure upon said bar is relieved said spring is permitted to act to move the bar in the opposite direction.

The sliding bar i' is normally held in an intermediate position, with the spring e''' pressed into engagement with the edge of the extension e'', see Fig. 1, and when so disposed pressure upon the end of the bar, tending to move it in a direction toward the left, acts to immediately move the extension and lift the locking-lever. The sliding bar is held in such intermediate position by a pin j on the stop-wheel or some other member of the signaling-train, which engages a cam f'' secured to the bar, and said pin is arranged at the right of the cam to permit movement of the sliding bar in a direction toward the left, and to prevent movement of said bar in the opposite direction until such time as the pin has been moved out of engagement with the cam by rotation of the stop-wheel. When the sliding bar is moved toward the left and lifts the locking-lever and thereby releases the train, the train starts, and very soon the pin j passes by the side of the cam f'', and at such moment movement of the sliding bar in the opposite direction is permitted, and is effected by the recovery of the spring e'''.
As here shown the stop-wheel is provided with two pins \(i\), for engaging the cam \(j^\prime\). arranged at diametrically opposite points, each disposed to engage said cam at the end of one half a revolution of the stop-wheel, which is at the end of four rounds of the signal.

When either pin \(i\) engages the cam \(j^\prime\), the sliding bar is moved from whatever position it may occupy, as for instance from a position at the extreme right, see Fig. 3, in a direction toward the left, to return it to its intermediate or normal position and hold it until said bar is again moved toward the left to again lift the locking-lever. As the sliding-bar is returned to its normal intermediate position by one of the pins \(i\) engaging the cam \(j^\prime\), the locking-lever is permitted to resume its normal position by the restoring-spring \(e^\prime\), and its detent \(e^\prime\) to enter one of the notches in the flange \(a^\prime\) of the stop-wheel and thereby stop the signaling-train. Hence it will be observed that the sliding bar is returned to normal by means operated by the signaling-train.

The sliding-bar is adapted to be moved from its normal or intermediate position toward the left to release the signaling-train, by the auxiliary actuating-mechanism, which latter is controlled by the auxiliary-magnet \(k\), and is subsequently adapted to be moved toward the right by the spring \(e^\prime\) for the purpose of operating a circuit-operating-device \(m\) to open the circuit of the auxiliary-magnet, and then to be restored to its normal or intermediate position by the signaling-train.

Auxiliary actuating-mechanism, such as may be employed for the purpose of moving the sliding-bar toward the left to release the signaling-train, will now be described, yet in lieu thereof other forms may be employed.

\(k\) represents the auxiliary-magnet, which, as is well known, is adapted to be included in the auxiliary-circuit, and to be operated by circuit-closers arranged in said circuit. The armature \(k^\prime\) of said magnet is attached to a lever \(k^\prime\), pivoted at \(k^\prime\). The circuit of the auxiliary-magnet is normally open, hence its armature is held normally retracted, see Fig. 1, by the spring \(k^\prime\).

The armature-lever has a forward extension \(k^\prime\) formed with a shoulder having two steps \(k^\prime\), \(k^\prime\), arranged one above the other, adapted to successively engage a pin \(n\), extended laterally from one side of an actuating-lever \(n^\prime\), pivoted at \(n^\prime\). Said actuating-lever extends downward and near its lower end bears an anvil \(n^\prime\), which is arranged remote from the end of the sliding bar \(i^\prime\) but when moved will strike said bar a sudden blow for the purpose of moving said bar in a direction toward the left to lift the locking-lever and release the signaling-train. Said actuating-lever has a laterally extended pin \(n\), with or without an insulating roll thereon, adapted to engage one member of the circuit-breaker \(m\) to move it away from its fellow member and thereby open the auxiliary-circuit, as shown in Fig. 3, said pin being arranged with respect to the circuit-breaker so as to engage one member thereof when the lever is moved in a direction toward the right, as it will be by the spring \(e^\prime\), when said spring is permitted to act. Said actuating-lever has a spring-controlled latch \(n^\prime\), pivotally supported upon it which rests on a pin \(n\), for the engagement of suitable means to move said lever.

A sleeve \(o\) is mounted on a shaft \(o^\prime\), having a cam \(o^\prime\), one end of which normally engages said latch \(n\), see Fig. 1, and exerts thereupon the pressure of a strong spring \(o\), which is connected by a link \(o^\prime\) with a short arm \(o^\prime\), secured to said sleeve \(o\), and when said sleeve is permitted to turn counterclockwise, said cam acts on said latch and swings the actuating-lever \(n^\prime\) on its pivot in a direction toward the left, to correspondingly move the sliding-bar. Said sleeve \(o\) is held with its spring \(o\) under tension by its cam engaging the latch \(n\), while the actuating-lever bearing said latch is held by its pin \(n\) engaging one of the steps, as \(k^\prime\), of the shoulder on the armature-lever, as represented in Fig. 1, and said sleeve \(o\) is released upon attraction of the armature of the auxiliary-magnet by the shoulder \(o^\prime\) disengaging the pin \(n\), and thereby at the same time releasing the lever \(n^\prime\). Said sleeve \(o\), when released is turned by the spring \(o^\prime\) a half revolution or thereabout. The sleeve \(o\) is restored to normal by hand, and as here shown, it is provided with a thumb and finger-piece \(o^\prime\), at its outer end for this purpose.

The pin \(n\) is normally held in engagement with the uppermost shoulder \(k^\prime\), so that when the armature is attracted it is immediately disengaged and the actuating-lever permitted to move by the pressure upon its latch of the spring-actuated cam \(o\). Thus when the auxiliary-magnet is energized and its armature is attracted the lever \(n^\prime\) is released and is moved with considerable force by the spring-actuated cam, and the anvil at its lower end is caused to strike the end of the sliding-bar a sudden blow and to move said bar toward the left and lift the locking-lever. As soon thereafter as the pin \(j\) disengages the cam \(j^\prime\), the spring \(e^\prime\), acts to move said sliding-bar in the opposite direction, and correspondingly move the actuating-lever \(n^\prime\) in the opposite direction, causing its pin \(n\) to engage one member of the circuit-breaker \(m\), and thereby open the circuit of the auxiliary-magnet.

The actuating-lever \(n^\prime\) is moved by the spring \(e^\prime\) to the extreme end of its stroke in a direction toward the right, see Fig. 3, and...
when in this position the pin $n$ occupies a position to engage the lowermost shoulder $k^2$ of the extension $k^1$; and engages said shoulder when the armature returns to its normal retracted position, which it will do as soon as the circuit is opened, either by the circuit-breaker $m$, or by the circuit-closer which operated the auxiliary-circuit, so that said lever $n'$ becomes locked in its position at the extreme right, thereby holding the circuit-breaker $m$ open. It will remain in this position until reset by hand. The sliding-bar, however, will be returned to its normal or intermediate position by the signaling-train at the end of a signal, leaving the actuating-lever $n'$ locked in its abnormal position.

When the sleeve $o$ is turned clockwise by hand for the purpose of re-setting it the spring $o^5$ is extended until the short arm $o^4$ is moved far enough for a pin $o^6$ thereon to engage a pin $o^7$ fixed to the shaft, and during such return movement the other end of the cam $o^5$ engages and lifts the latch, there-by permitting said cam to resume its normal position above the latch; and as the sleeve $o$ is thus restored a projection $o^8$ thereon engages an extension $o^9$ on the armature-lever, and depresses said lever far enough to permit the shoulder $k^2$ to disengage the pin $n$, and shoulder $k^1$ to engage said pin, thereby permitting the lever $n'$ to return to its normal intermediate position, and the circuit-breaker $m$ to close. Thus the auxiliary-circuit is restored to normal condition preparatory to being again operated, by the resetting of the auxiliary actuating-mechanism, and all the parts are in position to be again operated.

As the box is normally shunted, it is necessary that the shunt-switch be opened when the train is released by the auxiliary actuating-mechanism, and also when the box-door is opened, for the purpose of operating the box manually, and herein a single shunt-switch is employed, adapted to be operated by two separate means whereby these results may be accomplished. Referring particularly to Figs. 7 and 8 $g$ represents a shunt-lever, pivoted at $g'$, and carrying the movable member $g^2$ of a knife-switch, which is adapted to be operated to engage the stationary member $g^1$ of said knife-switch. Said knife-switch controls the shunt-circuit of the box, and when opened the box is included directly in the circuit and when closed is included in a shunt-circuit.

The shunt-lever $g$ has an extension $g'$ adapted to be engaged by one arm $g^2$ of a bell-crank lever, pivoted at $g'$, the other arm $g^3$ of said lever being extended into the path of movement of a pin $e^3$, projecting laterally from the locking-lever $e$, so that when said locking-lever is lifted to release the signaling-train, said bell-crank lever will be operated to move the shunt-lever to open the switch. Said shunt-lever also has arranged on it a forward extension $g^6$, which is inclined, and arranged to extend into the path of movement of a plunger $h$, arranged on a plunger-rod $k'$, which is adapted to slide in and out in bearings provided for it. The inner end of said plunger-rod bears against a spring $h^2$, and its outer end extends forward far enough to be engaged by the door of the box, so that when the box door is closed said plunger-rod will be pushed inward and the shunt-lever moved by its spring $g^9$ to close the knife-switch unless said switch is being controlled by the train, as heretofore described, but when the box door is opened said plunger-rod is moved outward by the spring $h^2$ and the shunt-lever is engaged by it and moved to open said switch.

Providing two separate means to operate the shunt-lever is of particular importance in connection with an auxiliary fire-alarm box, as in such case the signaling-train is adapted to be released by an auxiliary-magnet while the box-door is closed for the purpose of sending an alarm and the shunt-circuit is controlled by the train, and said train is also adapted to be operated manually when the box door is open, to send an alarm, and the shunt-circuit is controlled by the opening of the door, and also by the train, the latter in case the door is closed before the signal has been sent.

Referring to Fig. 4, the locking-lever has arranged in connection with it a pair of resilient contact-members adapted to form a circuit-controller for a ground circuit, which may be closed when the locking-lever is lifted to release the signaling-train.

I claim:

1. In an auxiliary fire-alarm box, the combination of a signaling-train having a locking-lever, a movable member engaging said locking-lever, an actuating-lever arranged remote from said member and adapted when released to strike said member a blow to suddenly move it to lift said locking-lever, a detent-lever normally engaging said actuating-lever controlled by the auxiliary-magnet and spring-actuated means for moving said actuating-lever when released by said detent-lever, substantially as described.

2. In an auxiliary fire-alarm box, the combination of a signaling-train having a locking-lever, a sliding bar engaging said locking-lever, a pivoted actuating-lever arranged remote from the end of said sliding-bar and adapted when released to strike said bar to lift the locking-lever, a detent-lever normally engaging said actuating-lever, controlled by the auxiliary-magnet, and spring-actuated means for moving said actuating lever when released by said detent-lever, substantially as described.
3. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, a pivoted actuating-lever for said locking-lever bearing an anvil for striking a blow to suddenly move said locking-lever, spring-actuated means normally engaging said actuating-lever for moving it, a detent-lever normally engaging said actuating-lever to hold it with the spring-actuated means set in condition to operate an electro-magnet and armature therefor controlling said detent-lever, substantially as described.

4. In an auxiliarized fire-alarm box, the combination of a signaling-train, a pivoted locking-lever, a pivoted actuating-lever having a pivoted latch, a cam engaging said latch, a shaft bearing said cam, a spring connected with said shaft for turning it in one direction, and means connected with said shaft for resetting it, a detent-lever engaging said actuating-lever to hold it with the spring operated cam-shaft set in condition to operate, and an electro-magnet and armature to control the operation of said detent-lever, substantially as described.

5. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, an actuating-lever for said locking-lever, a detent-lever controlled by the auxiliary-magnet for normally holding said actuating-lever in an intermediate position, spring-actuated means for moving said actuating-lever in one direction when released by the detent-lever to operate the locking-lever, a circuit-breaker for the auxiliary-circuit, and means for subsequently moving said actuating-lever in the opposite direction to operate said circuit-breaker, substantially as described.

6. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, an actuating-lever for said locking-lever, a detent-lever controlled by the auxiliary-magnet for normally holding said actuating-lever in an intermediate position, spring-actuated means for moving said actuating-lever in one direction when released by the detent-lever to operate the locking-lever, a circuit-breaker for the auxiliary-circuit and means controlled by the signaling-train for subsequently moving said actuating-lever in the opposite direction to operate said circuit-breaker, substantially as described.

7. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, an actuating-lever for said locking-lever, a detent-lever controlled by the auxiliary-magnet having two engaging-portions, one for normally holding said actuating-lever in an intermediate position, and the other for holding said actuating-lever in an abnormal position, spring-actuated means for moving said actuating-lever in one direction when released by the detent-lever to operate the locking-lever, a circuit-breaker for the auxiliary-circuit and means for subsequently moving said actuating-lever in the opposite direction into engagement with the detent-lever to operate said circuit-breaker, means for moving said detent-lever to momentarily release the actuating-lever permitting it to resume its normal intermediate position, substantially as described.

8. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, an actuating-lever for said locking-lever, a detent-lever controlled by the auxiliary-magnet having two engaging-portions, one for normally holding said actuating-lever in an intermediate position, and the other for holding said actuating-lever in an abnormal position, spring-actuated means for moving said actuating-lever in one direction when released by the detent-lever to operate the locking-lever, a circuit-breaker for the auxiliary-circuit and means for subsequently moving said actuating-lever in the opposite direction into engagement with the detent-lever to operate said circuit-breaker, means for moving said detent-lever to momentarily release the actuating-lever permitting it to resume its normal intermediate position, substantially as described.

9. In an auxiliarized fire-alarm box, the combination of a signaling-train having a locking-lever, an actuating-lever for said locking-lever, a detent-lever controlled by the auxiliary-magnet having two engaging-portions, one for normally holding said actuating-lever in an intermediate position, and the other for holding said actuating-lever in an abnormal position, spring-actuated means for moving said actuating-lever in one direction when released by the detent-lever to operate the locking-lever, a circuit-breaker for the auxiliary-circuit and means for subsequently moving said actuating-lever in the opposite direction into engagement with the detent-lever to operate said circuit-breaker, means for moving said detent-lever to momentarily release the actuating-lever permitting it to resume its normal intermediate position, substantially as described.
to operate said circuit-breaker, and means operated by the train for returning said member to and for holding it in its normal position, substantially as described.

11. In an auxiliary fire-alarm box, the combination of a signaling-train having a locking-lever, a bar engaging said locking-lever, normally held in any intermediate position, auxiliary-actuating mechanism including an actuating-lever for moving said bar in one direction to operate the locking-lever, a circuit-breaker for the auxiliary-circuit, adapted to be operated by said actuating-lever, means for moving said bar in the opposite direction to move the actuating-lever to operate said circuit-breaker, and means operated by the signaling-train for returning said bar to and for holding it in its normal intermediate position, substantially as described.

12. In an auxiliary fire-alarm box, the combination of a signaling-train having a locking-lever, a bar engaging said locking-lever, normally held in an intermediate position, auxiliary actuating-mechanism including an actuating-lever for moving said bar in one direction to operate the locking-lever, a circuit-breaker for the auxiliary-circuit, adapted to be operated by said actuating-lever, a spring on the locking-lever for moving said bar in the opposite direction to move the actuating-lever to operate said circuit-breaker, and means operated by the signaling-train for returning said bar to and for holding it in its intermediate position, substantially as described.

13. In an auxiliary fire-alarm box, the combination of a signaling-train having a locking-lever, a bar engaging said locking-lever, normally held in an intermediate position, auxiliary actuating-mechanism including an actuating-lever for moving said bar in one direction to operate the locking-lever, a circuit-breaker for the auxiliary-circuit, adapted to be operated by said actuating-lever, means for moving said bar in the opposite direction to move the actuating-lever to operate the circuit-breaker, a pin on one of the train-wheels arranged to engage the bar to return said bar to and hold it in its normal intermediate position, substantially as described.

14. In an auxiliary fire-alarm box, the combination of a signaling-train, a locking-lever therefor, an auxiliary magnet, and means controlled by said magnet to move said locking-lever, a shunt-switch for the box, a switch-lever, means operated by the locking-lever for moving said switch-lever to open the shunt-switch when said locking-lever is operated to release the signaling-train, and means operated by the opening of the box-door for also operating said switch-lever to open the shunt-switch, substantially as described.

15. In a signal-box, a shunt-switch for the box, a switch-lever, means operated by the locking-lever for moving said switch-lever to open the shunt-switch when said locking-lever is operated to release the signaling-train, and means operated by the opening of the box-door for also operating said switch-lever to open the shunt-switch, substantially as described.

16. In a signal-box, the combination of a shunt-switch for the box, a switch-lever, means operated by the locking-lever for the signaling-train for moving said switch-lever to open said switch, and a plunger-rod controlled by the box door, arranged to move said switch-lever to open said switch, substantially as described.

17. In a signal-box, the combination of a shunt-switch, a switch-lever, a bell-crank lever operated by the locking-lever for the signaling-train to move said switch-lever and open the shunt-switch, and means operated by the opening of the box-door for moving said switch-lever to operate the shunt-switch, substantially as described.

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

NATHAN H. SUREN.

Witnesses:
CHARLES H. MOUTON,
EDWARD J. COLEMAN.