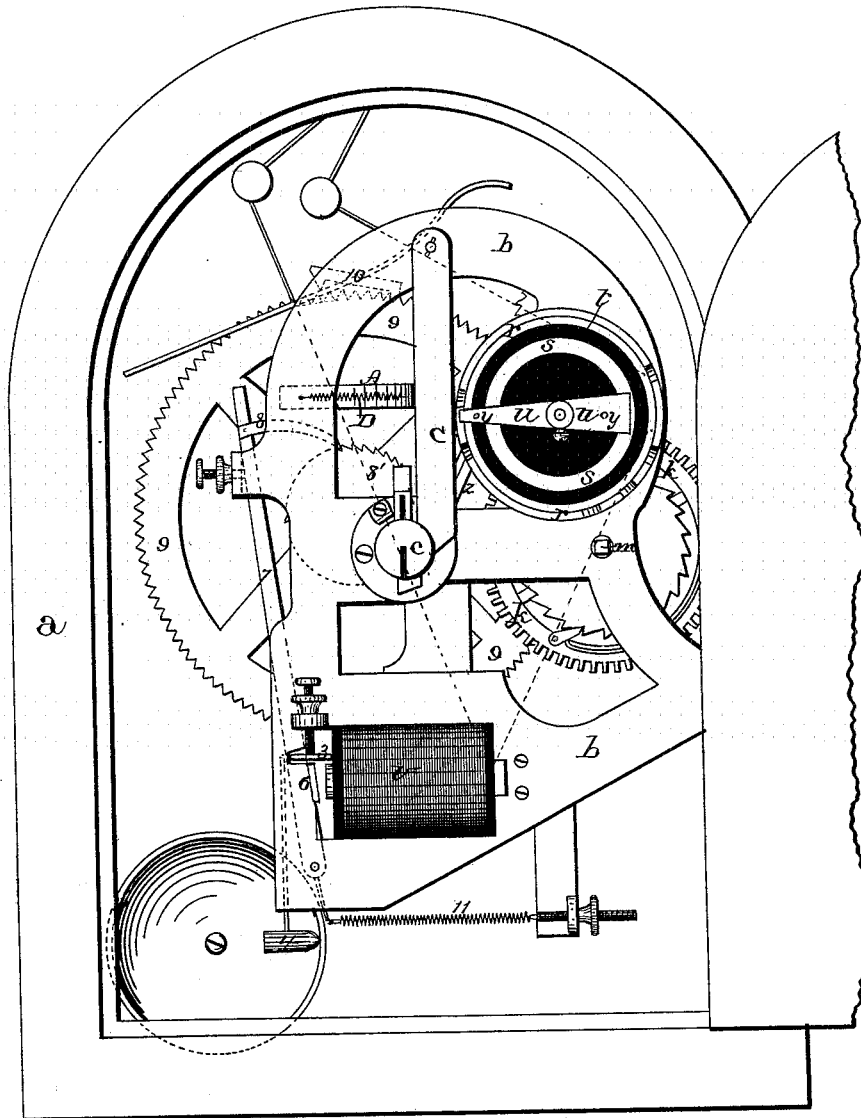


A. W. GRAY.  
Non-Interfering Signal-Boxes.  
No. 220.755. Patented Oct. 21, 1879.

Fig. 1.



Witnesses:

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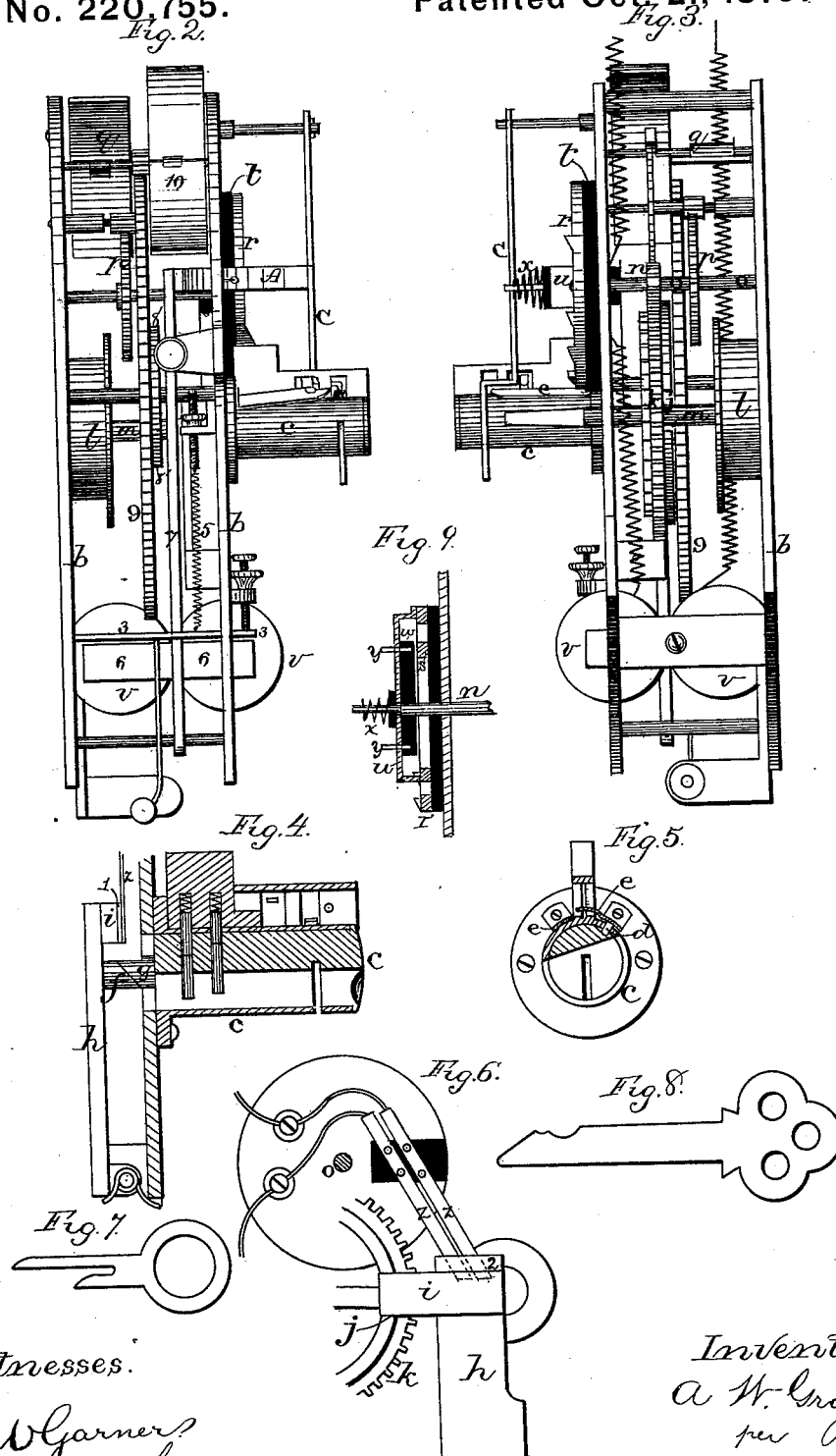
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN NON-INTERFERING SIGNAL-BOXES.

Specification forming part of Letters Patent No. **220,755**, dated October 21, 1879; application filed July 23, 1879.

*To all whom it may concern:*

Be it known that I, ADELBERT W. GRAY, of Cardington, in the county of Morrow and State of Ohio, have invented certain new and useful Improvements in Non-Interfering Signal-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improved non-interfering signal-box which is to be used in fire-alarm and district telegraphs; and it consists, first, in a spring or series of springs which fasten the cylinder of the lock in place after it has been turned partially around by the key, for the purpose of giving a signal, and thus holding the key used in giving the signal fast in the lock until the person having the relief-key arrives and releases the key; second, in a device which springs into the lock so as to prevent the insertion of a key while a signal is being given in any other box in the circuit, for the purpose of preventing interference in the signals; third, in the peculiar construction of the circuit-breaker, composed of two insulated rings, and a contact-breaker, which is held in contact with the rings by means of a spring; fourth, in the peculiar construction and arrangement of parts, which will be more fully described hereinafter.

Figure 1 is a front view of my invention, the door of the box being open. Figs. 2 and 3 are side elevations of the same, taken from opposite sides. Figs. 4 and 5 are details of the lock. Figs. 6, 7, and 8 are detail views of the keys. Fig. 9 is a vertical section of the contact-breaker.

*a* represents the frame of a fire-alarm box, which may be of any construction desired. Inside of this box is secured a suitable framework, *b*, in which the various parts of the mechanism are secured. To the front part of this frame is secured a lock, *c*—such as is known as the “Yale lock” being preferred—the outer end of the cylinder of the lock being made to project through the door at or near its center. This lock is used only for turning in signals, and not for opening the door of the

box, as the door is kept locked by a separate and distinct lock, so that only the inspector of the boxes can have access to their insides. By thus having the signal-lock project through the door there is no need of opening the box every time a signal is turned in, and thus exposing the works of the alarm to dust, rain, and snow.

When the alarm-key is inserted in the lock and the cylinder of the lock is turned one-quarter around, one, two, or more projections, *d*, attached to springs *e*, snap into recesses in the cylinder, and thus lock it securely in place, so that the alarm-key cannot be withdrawn until the engines or person having a relief-key arrives and releases the key from the lock.

As each key will be numbered, it will always show by whom the alarm was turned in, and as the key cannot be withdrawn by the one who gave the signal he will have to remain at the box until the engines arrive, so as to direct them to the house where the fire is.

The relief-key is one of such a form that when inserted into the cavity above the cylinder the projections will be raised up out of the cylinder, when the alarm-key can be turned on around and taken out.

In Fig. 7 is shown the form of relief-key used by me, and in Fig. 8 the form of the key for turning in an alarm. Of course the forms of these keys may be changed at will, for no special invention is claimed in these forms alone.

This relief-key is intended as a means of identifying those who turn in the alarms, and thus serves as a very useful check in the giving of false alarms.

Secured to the inner cylinder of the lock is a rod or shaft, *g*, which has its end beveled away, and which bears against a projection, *f*, also having a beveled end, and which is secured to the upper end of the locking-plate *h*. This plate, which has two separate and distinct functions, is pivoted at its lower end, and is always held pressed forward at its upper end by means of a suitable spring, and has a projection, stud, or catch, *i*, fastened to its upper end, so as to catch in a recess, *j*, formed in the back of the wheel *K*.

When the signal-key is inserted in the lock

and the cylinder turns one-quarter around, the rod or shaft *g*, bearing against the projection *f*, forces the upper end of the locking-lever *h* backward far enough to move the catch *i* out of the recess *j*, and thus allow the wheel K to be freely turned around by means of the spring *l* on its shaft. The wheel K has, preferably, two of these recesses in its side, so that it will give two alarms for each revolution. This wheel K, which is secured to the winding-shaft *m*, meshes with the pinion *n* on the shaft *o*, which revolves the contact-breaker three times around for every half-revolution of the wheel K.

To the shaft *o* is also secured a wheel, *p*, which operates a suitable escapement, *q*, for regulating the speed at which the contact-breaker shall move.

The circuit-breaker consists of two rings, *r* and *s*, which are insulated from every other part of the apparatus by being secured to a hard-rubber base, *t*, there being a sufficient space left between them to keep them entirely separated. Upon the outer one of these two rings are projections or studs arranged in groups, so as to indicate the number of the box, and which serve to complete the circuit through the two rings as the contact-breaker *u*, operated by the shaft *o*, sweeps over them.

The wire from one pole is connected to one ring, and from the other ring a second wire passes down to the magnet *v*, and from the magnet a third wire passes out and connects to the other pole of the battery.

To the shaft *o* is secured the non-conducting strip, which reaches out at one end beyond the inner ring, *s*, and on this strip is placed the contact-breaker *u*, which is held in place by the small conical spring *x*. In order to insulate this contact-breaker at every point, a non-conductor is placed between the spring and it, and the breaker is kept from coming in contact with the shaft *o* by having the hole through which the shaft passes considerably larger than the shaft, and the breaker is then held rigidly in place by means of the pins *y*, which project through the breaker from the strip *x*.

The shorter end of the breaker is always in contact with the inner ring, while the longer end only touches the outer ring and completes the circuit when it passes over one of the projections or studs. This contact-breaker always sweeps around three times, repeating the signal each time, and then stops on the first projection or stud, so as to form a complete circuit.

In order not to depend upon this contact-breaker alone in keeping up a complete circuit, as it might sometimes move beyond the first stud in stopping, owing to some imperfection in some part of the machine, and thus leave the circuit open and render all the boxes on that line useless, an auxiliary circuit-closer is used. This auxiliary closer consists of the two strips *z*, which are fastened to a non-conductor on the inside of the frame *b* just back of the regular circuit-closer, and each one has

a wire secured to its upper end to connect it with one of the two rings *r s*. The lower ends of these strips bear, when the alarm mechanism is at rest, against a small conducting-plate, 1, which is secured to a non-conducting base, 2, on the pivoted locking-plate *h*, as shown in Fig. 4. When this lever is forced backward to give a signal it carries the plate back out of contact with the ends of the strips; but after the wheel K has made half a revolution, and then been stopped by the stud *i* catching in the recess *j*, the plate 1 again unites the ends, so as to form a complete circuit in case the other circuit-closer should fail to act. These strips also serve to overcome the resistance necessarily attending such contacts as are between the breaker and the studs.

Each time that a signal is turned in on one box, and the contact-breaker forms the circuit, the core in the magnet *v* becomes magnetized and draws down to it the armature 3, which has connected to it the hammer 4, and when the circuit is broken the spring 5 draws the armature upward and causes the gong to strike the bell. Thus if, while a signal is being given from one box, a person should try to turn in a signal from another box, while he could not insert his key to give the alarm, he would hear the signal being given and know that the box was not at that moment in condition to receive another signal. Each time the core in the magnet becomes magnetized it draws toward it a second armature, 6, which is secured to a long lever, 7, having a spring-dog, 8, secured to its upper end. The dog engages with the ratchet 8', which is secured to the same shaft as the large wheel 9, which wheel 9 has its movements controlled by the escapement 10. While the signal is being given during the short intervals in which the circuit is closed, the magnet has not time to draw the armature and lever up to it, for the dog 8 strikes against the ratchet, and before the ratchet can be moved far enough around to let the armature reach the magnet, owing to the slow movement of the large wheel 9, the circuit is broken, and then the spring 11 draws the lever and armature back away from the magnet. When, however, the circuit is once closed after the signal is given, the armature and lever are drawn up to the magnet, and just before the lever stops its upper end comes in contact with the arm A of the hanger C. The lower end of the hanger is shaped as shown, and fits in a slot that is cut in the side of the cylinder of the lock *c* far enough to prevent the alarm-key from being inserted to turn on a signal.

While the circuit is closed the upper end of the lever 7 forces the hanger far enough to one side to let the alarm-key be freely inserted into the lock at any time; but while the signal is being turned in from one box the circuit is broken, the lever 7 is drawn away from the magnet by the spring 11, and then the hanger C is drawn by the spring D into the slot in the side of the cylinder of the lock, so as to shut

out any key. The moment after the alarm is given and the circuit closed the hanger is pushed to one side, and the key-hole is left free. In this way it is utterly impossible for signals to be given so as to interfere with each other.

All the time that the key-hole is locked the alarm is being struck in the box, so as to show the reason why the key-hole is not open. This striking mechanism also serves to indicate to all near the box at what point the alarm has been turned in.

Having thus described my invention, I claim—

1. In an alarm and telegraph box, a lock for turning in a signal without opening the door of the box, and a separate and distinct lock for keeping the door closed, in combination with a mechanism that is operated by a magnet for closing the key-hole of the lock through which the signal is turned in, and a retarding mechanism to prevent the plate *c* from being acted on in between the strokes of the signal, whereby every box in the circuit is closed against another signal being given until the signal already given is done, substantially as shown.

2. In an alarm and telegraph box, the combination of a lock for turning in an alarm, a device for closing the key-hole against the insertion of a key while the alarm is being sounded, a magnet for operating the device for opening the key-hole, a retarding mechanism to prevent the device for closing the key-hole from being acted on between the strokes of the signal, and a spring to close the hole when the circuit is broken, substantially as shown.

3. The combination of a suitable lock, *c*, having a slot in the side of its cylinder, with a device for fitting in the slot and closing up the key-hole, and a suitable mechanism for moving the device in and out of the slot as the circuit is opened and closed, substantially as described.

4. The combination of a lock for giving the signal, having a rod or bar, *g*, on the inner end of its cylinder, a locking-lever, *h*, that is op-

erated by the said rod or bar, a spring, *l*, and a mechanism for revolving the contact-breaker, substantially as set forth.

5. The combination of a pivoted spring locking-lever provided with a stud or projection, *i*, to catch in a recess, *j*, in the wheel *K*, whereby the contact-breaker is released when a signal is given, and then locked in place after it has moved a given number of times around the circuit-breaker, substantially as specified.

6. In a circuit-breaker, the two rings *r s*, insulated from each other and the frame-work, and connected with the opposite poles of the battery, in combination with the contact-breaker, that has one end always in contact with the ring *s*, and which completes the circuit by touching the projecting points on the ring *r* as it sweeps around, the points forming a part of the ring, substantially as shown.

7. The combination of the contact-breaker with the non-conductor *w*, spring *x*, and pins *y*, the breaker being insulated at every point from the shaft, substantially as described.

8. The combination of the locking-lever *h*, having a conducting-plate secured to it, the two strips, *z*, and wires for connecting the strips with the rings *r s*, substantially as set forth.

9. In an alarm and telegraph box, the combination of the magnet *v* with an armature, 3, for striking the alarm, and an armature, 6, for operating the lever that closes the key-hole while the alarm is being given, both armatures being operated at an angle to each other by the same core, substantially as specified.

10. In an alarm and telegraph box, the combination of the magnet *v*, a lever, 7, and armature 6 with a dog, ratchet-wheel 9, escape-ment 10, a hanger for closing the key-hole, and the springs 11 and D, substantially as shown.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of July, 1879.

ADELBERT W. GRAY.

Witnesses:

W. S. D. HAINES,  
J. W. GARNER.