(No Model.) 2 Sheets—Sheet 1.

G. F. MILLIKEN.

FIRE ALARM TELEGRAPH.

No. 453,982. Patented June 9, 1891.

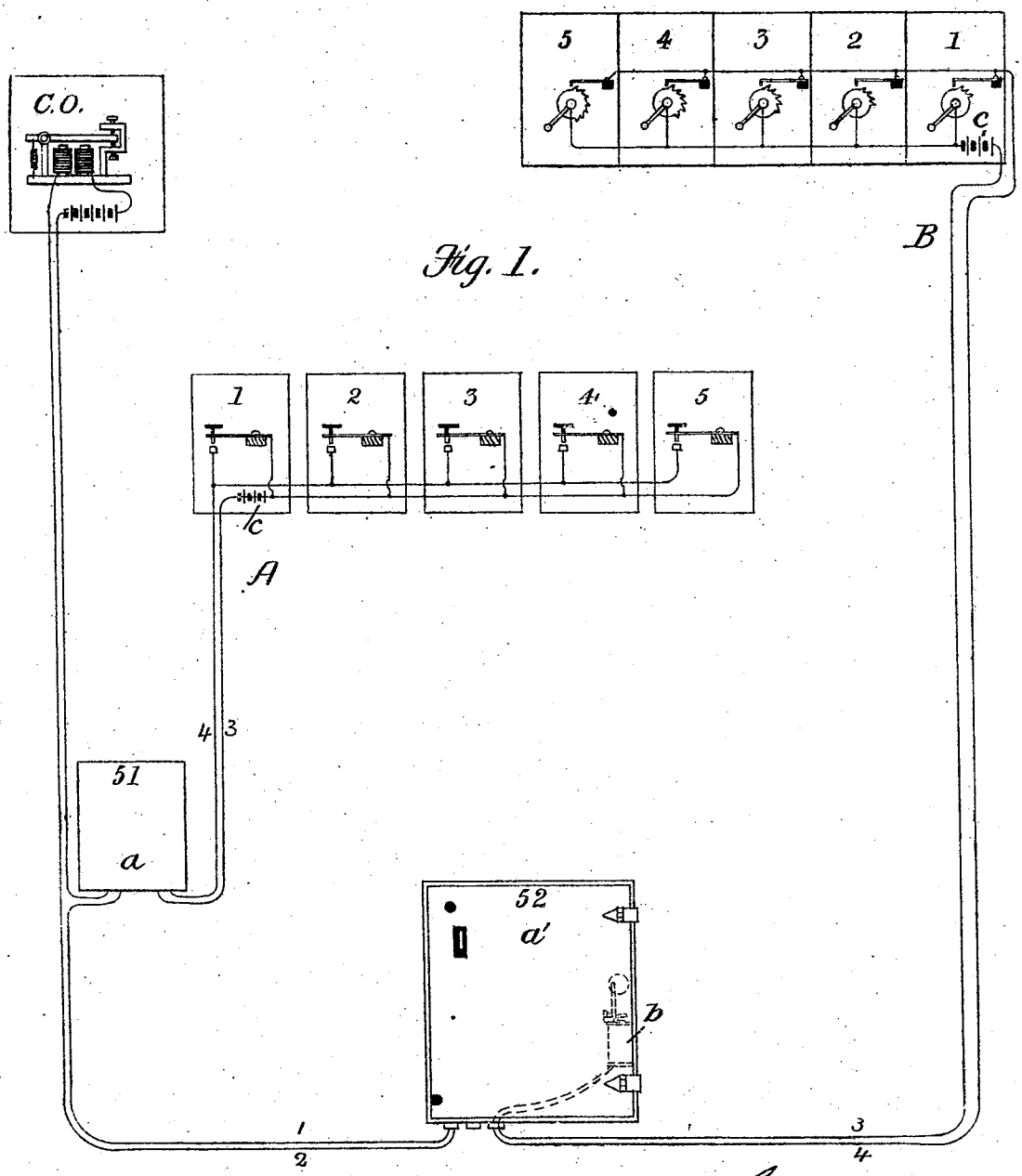

Fig. 1.

Witnesses.
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A. P. Sawyer

George F. Milliken
Inventor.
by Scott Willis Pierce
Attorney

(No Model.) 2 Sheets—Sheet 2.

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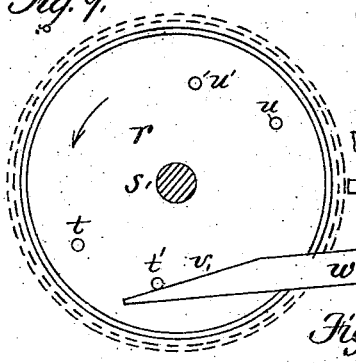
Fig. 1.



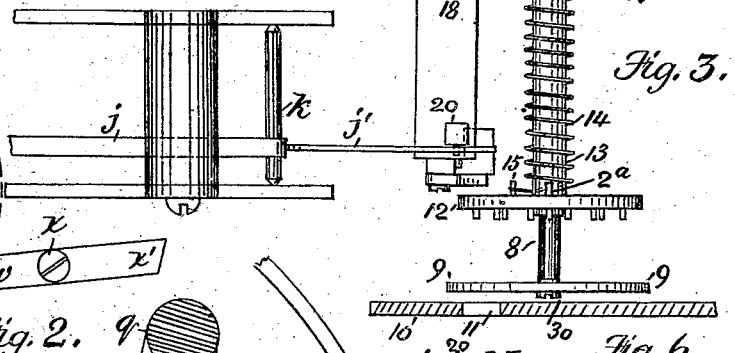


Fig. 3.

Fig. 2.

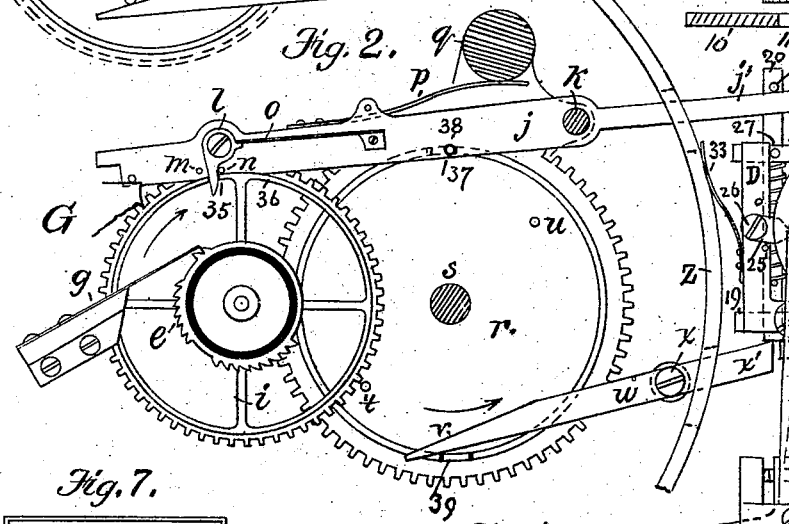


Fig. 6.

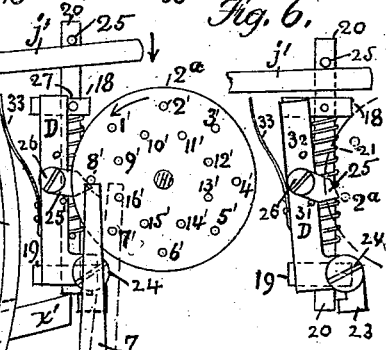


Fig. 7.

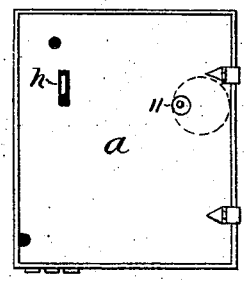
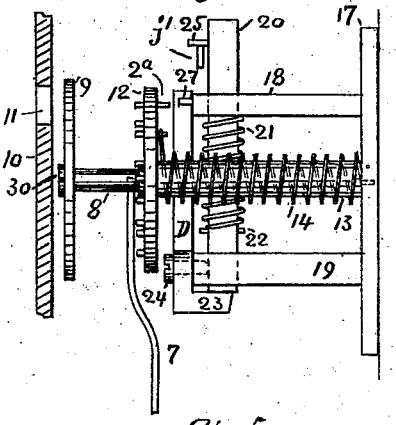


Fig. 4.



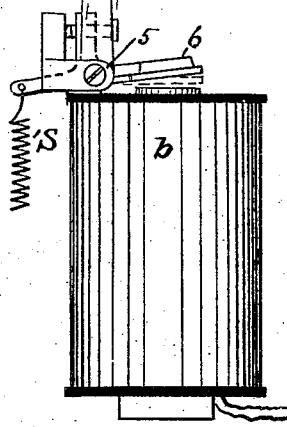


Fig. 8.

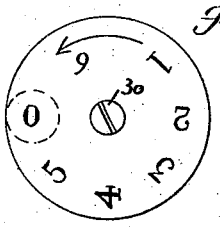
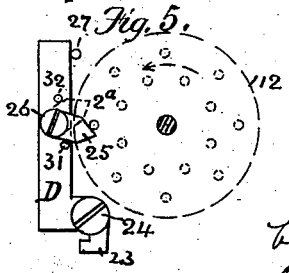


Fig. 5.



Witnesses.

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A. P. Sawyer

Inventor:

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by Geo. Willis Pierce,

attorney

UNITED STATES PATENT OFFICE.

GEORGE F. MILLIKEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE GAMEWELL AUXILIARY FIRE ALARM COMPANY, OF SAME PLACE.

FIRE-ALARM TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 453,982, dated June 9, 1891.

Application filed February 24, 1891. Serial No. 382,421. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. MILLIKEN, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Fire-Alarm Telegraphs, of which the following is a specification.

This invention relates to fire alarm systems, and especially to those which combine, first, a main system consisting of a number of street-boxes in a circuit or loop located at various points in a district and are connected with a central or main office, each box inclosing circuit-operating mechanism to be manually released to produce an alarm at the said main office, with, second, auxiliary means located in private dwellings, business-offices, factories, &c., at a distance from and which are connected to one or more of the said boxes, whereby their circuit releasing and operating mechanism can be automatically set in motion to give an alarm at the main office.

My invention relates to a method of releasing from an auxiliary station the train of wheels in a fire-alarm or other signal-transmitting box which has been previously wound by means of an independent electro-mechanical trip.

It also comprises a method of visually indicating at the signal-sending street-box the exact location or station from which the releasing-magnet in said box is operated.

It also comprises means for preventing the signal-box-wheel train from being released or operated by an accidental closure of the circuit through the helices of the releasing-magnet.

I do not herein claim the releasing of a signal-transmitting train of wheels by means of an electro-mechanical trip *per se*, as such devices are well known to me; but in all such devices heretofore used or known, so far as I am aware, the releasing device is operated by a motor which is of sufficient power to release and reset the device a number of times before it has to be renewed or restored, necessitating a complexity of parts, while in my invention the power of the motor is spent in the operation of once releasing the train which operates the break-wheel, and is automatically restored by the motor which operates the break-wheel and during the time the signal is being transmitted to the central station and simultaneously with the resetting of the break-wheel detent or toggle. By this arrangement I am enabled in such a signal-transmitting box as is herein shown to remove and hold that part of the electro-mechanical trip which is under the strain of the spring or weight, and which, as employed by me, if not so removed and held, would prevent the train from being stopped at the proper time after the transmission of a predetermined number of signals or until the ~~force of the~~ main spring had been spent. As this feature of the fire-alarm signal-box is no part of my invention, I do not consider it necessary to describe its operation.

In the drawings, Figure 1 shows a fire-alarm system in which two boxes *a a'* are connected in a closed circuit with the main office C O, a relay being shown as the signal-receiving instrument. Auxiliary circuits A B are shown connecting one with each box, the former circuit A representing five auxiliary stations, each in a separate building, and the latter B representing five such stations in one building, each in a separate apartment. In stations A common strap-keys are shown as circuit-closers or signal-transmitters, while at the stations B are shown district box-transmitters, the circuits in both series A and B being represented as normally open and metallic, batteries being located at one station in each series common to all of the signal-transmitting devices. Fig. 2 shows such portions of a fire-alarm-box apparatus in face view as are necessary to illustrate my invention, which is shown in connection therewith. Fig. 3 is a top side view of a portion of Fig. 2. Fig. 4 is a side view of the auxiliary electro-mechanical tripping and resetting device shown in Figs. 2 and 3. Fig. 5 is a detached portion of the releasing and setting apparatus. Fig. 6 is a view of a part of Fig. 2, showing the tripping device released. Fig. 7 is a view of the front of a fire-alarm box to show the indicating signal-sending station device, and Fig. 8 is a face view of the indicating-disk. Fig. 9 shows a modification of the mechanical means for automatically resetting the trip.

As shown in Fig. 1, wires 3 4 extend from

the auxiliary stations to the electro-magnet *b*, located in the fire-alarm boxes *a a'*, the signal-sending devices at the stations being connected in normally-discontinuous multiple arcs with the wires. The battery *c* is connected in at the station nearest the street-box, and when the signal-sending devices at the auxiliary stations are properly manipulated the releasing apparatus in the box is disengaged and an alarm sounded at the central office, as the circuit through the wires 1 2 is opened and closed by the break-wheel *e*, operated by the wound clock-train.

At stations in series B, I have shown for signal-sending mechanism break-wheels as commonly used in district boxes, the wheel No. 1 having three teeth, wheel No. 2 four teeth, &c., each wheel having two more teeth than its station-designating number. The electro-mechanical trip in the street-box *a* will not be started until the station break-wheels have made three successive closures of the circuit, so that one or two accidental movements of the electro-mechanical escapement will not effect any movement whatever of the street-box break-wheel or of its wheel-train; but when the district-wheel at any of the stations makes three successive closures of the circuit the street-box movement is instantly released. The extra teeth on the station-wheels are for the purpose of bringing the indicating-disk around step by step to show through the orifice 11 of the box-door the individual number of the station sending the alarm. The same results as described of the district-wheels can be obtained by the use of the keys shown at stations in series A, connected with the street-box a^{51}, it being necessary for station 1 to make three closures of the key before the starting mechanism at the street-box is at all affected.

Referring now to the apparatus inclosed in the street-box, wires 3 4 from the auxiliary stations enter the street-box *a* and connect with the electro-magnet *b*. Its armature 6 is pivoted at 5 and has an escapement-arm 7 extending upwardly. 13, Fig. 3, is a spindle fixed in a base 17, which is secured to the box *a*. Upon the outer end of the spindle is a sleeve 8, bearing on each end a disk 9 and 12. The sleeve and disks are secured to the spindle by the screw 30 and rotate upon the body of the same. The outer disk 9 serves as an indicator, and has upon its face characters to designate the auxiliary stations connected to the box, which appear to view through a hole 11 in the cover of the box and indicate the condition of the circuit. The inner or escapement disk 12 has inserted upon its face two concentric rows of pins—eight in each row. All of the pins project evenly from the outer face of the disk, and but one 2^a projects through from the inner face. A spiral spring 14 encircles the spindle 13, one end of which is secured to the base 17 and the other end to pin 15 on the inner face of the disk 1[illegible]. When the spring 14 is wound up (which is accomplished by turning the disk 12 around manually) the lever in its normal position rests under pin 8' and prevents the spring from unwinding. In this position the indicating-disk 9 will show zero (0) through the door-orifice 11 and indicate that the auxiliary-station signal-sending wheels are in an undisturbed position, as shown in series B, Fig. 1.

18 and 19 are standards supported by the base 17.

20 is a sliding bolt passing through the ends of the standards 18 and 19.

21 is a spiral spring around the bolt between the standards pressing against the lower side of the standard 18 and upon pin 22 in the bolt.

D is a tripping-lever pivoted at its lower end to the standard 19 by the screw 24, having a hooked lower end 23, upon which rests the lower end of the bolt 20, as shown in Figs. 2, 3, and 4. The upper end of the lever D rests against the stop-pin 27.

Midway of the lever D is a toggle-piece 25', pivoted thereto by the screw 26, its free end coming to a point, being beveled on both sides. When the indicating-disk and the escapement-disk are being turned to their normal position to indicate "0," to reset the same the spring 14 is wound, and the pin 2^a strikes the under side of this toggle 25', raising it up, (see dotted lines in Fig. 5,) and passes along. Stop-pins 31 and 32 limit the motion of the toggle, its position in Figs. 2 and 5 being normal. A spring 33, secured by one end to the lever D and pressing upon the box-partition *z*, keeps the lever firmly in place.

G refers generally to the mechanism of the street-box, a few parts only of which are shown.

r is the main wheel of the clock-train, moved by a spring-motor. (Not shown.) Through intermediate gearing the break-wheel *e* and its immediately-connected wheel *i* are operated.

j is a locking or controlling lever pivoted at *k*, one end of which extends over the wheel *i* and is provided with a locking-toggle *l*, which enters a slot 35 in the rim 36 of the wheel *i*. The lever *j* has a spring *p*, which keeps it down to its work, and a pin 37 to enter slots 38 and 39, all of which is well understood.

Projecting from the lever *j* is an arm *j'*, reaching through the partition *z* to the bolt 20, its upper side nearly touching the pin 25 in the bolt.

w is a lever pivoted at *x*. One of its arms extends across the face of wheel *r* and has the outer length thereof beveled, as *v*. The other arm *x* extends through the partition *z* and terminates under the bolt 20.

Pins *u* and *t* project from the face of the wheel *r*.

The operation of the street-box apparatus is in no wise disturbed by the application thereto of my invention. It can be manually operated the same in all respects, for when the controlling-lever *j* is elevated by pulling down

the hook, as is usual, the arm j' thereof moves downward away from the pin 25 in the direction of the arrow, and when the lever j is returned to its locking position the arm j' returns, the box mechanism operating independently.

When the controlling-lever j is to be released and an alarm sent into the central office from any auxiliary station, the operation is as follows: Say that station No. 1 in series B sends an alarm by turning the handle of its wheel, causing three makes and breaks of the circuit-wires 3 4. By means of the battery c the electro-magnet b is magnetized and demagnetized three times. Upon the first closure of the circuit the armature 6 is drawn down. The escapement-lever 7 is brought forward into the position shown in dotted lines, Fig. 2, away from the pin 8'. The spring 14 turns the disk 12 in the direction of the arrow and brings the pin 9' onto the end of the lever 7, stopping the rotation of the disk. When the circuit 3 4 is opened, the spring S pulls the armature 6 and lever 7 back into position (shown in full lines) away from the pin 9. The spring 14 then operates to rotate the disk 12 and brings the pin 1' onto the end of the lever 7. These movements are repeated until the pin 2^a rotates over onto the end of the lever 7, and is tripped and forces itself against the bevel of the toggle 25, (see Fig. 5,) which is held from moving downward by the pin 31, and it, with the lever D, is forced by the pin 2^a backward into the position shown in Fig. 6, the disk 12 continuing to rotate until stopped by the inner pin 11' striking the end of the lever 7, and finally when the electro-magnet b is demagnetized it is stopped with the pin 3' resting on the end of the lever 7. As the lever D is forced over, its hooked arm 23 is drawn from under the bolt 20. This releases the bolt, and its spring 21 forces it downward, carrying with it, by means of the pin 25, the lever j' in the direction of the arrow. As this goes down it raises its other arm j, pulling the toggle l from the rim 36, and starting the clock-train of the street-box, and the break-wheel e, rotating under the springs g, opens and closes the central-office circuit and sounds the box number. When the disk 12 is in the position last described, the pin 3 resting on the lever 7, the indicating-disk 9 (which rotates with the disk 12) shows the number "1" through the hole 11 in the box-cover, and a fireman arriving at the box sees that auxiliary station No. 1 rung in the alarm. When the tripping apparatus is in its normal position, 0 shows through the box-hole 11. All the other stations, Nos. 2, 3, 4, and 5, are operated as described of No. 1. The third closure of the circuit trips the bolt 20, which releases the controlling-lever j, and all other closures of the circuit 3 4, by means of the added teeth of the wheels, are to bring the indicating-disk around step by step to show through the orifice 11 the number of the auxiliary station which originated the alarm.

The electro-mechanical releasing and tripping device is divisible into two co-operating portions: first, the electro-magnet and its armature, which sets in motion the second or mechanical motor by which the break-wheel e is released. The force of the mechanical motor is wholly spent by its operation and is restored automatically as follows: In the street-box mechanism shown the break-wheel e repeats the box number, say, four times while the main wheel r rotates one half of a revolution. I therefore provide the pins t and u to operate for each complete alarm sent by the break-wheel to the central office. As soon as the box mechanism is released the main wheel r commences to rotate and brings the pin t against the beveled lever w, gradually depressing the same and elevating the arm x', which raises the bolt 20 to the position shown in Fig. 2, when the spring 33 forces the lever D back against the pin 27, at the same time bringing the hooked end 23 under the end of the bolt. By this time the pin t has passed the lever w, and the wheel r continues to rotate until the pin 38 drops into the slot 39, the toggle l at the same time dropping into the slot 35 and stopping the train.

In Fig. 9 I have shown a modification of the resetting device. Instead of one pin t I show two pins t and t', set so as to divide the work of depressing the lever w, taking more time in the operation.

It will be observed that the auxiliary releasing mechanism is entirely separate from that of the street-box in so far that it does not interfere with the separate operation of the latter, and that the former is entirely reset before the complete alarm is made, so that bolt 20 is away from any contact with the arm j' in case the box mechanism should be released. The indicating-disk is always turned back to zero by an inspector if it has been accidentally tripped around one or two teeth, or by a fireman if an alarm has been struck.

I do not confine myself to the precise mechanism shown for electro-mechanically releasing the street-box apparatus and resetting the said mechanism, as I may employ other forms without departing from the spirit of my invention.

I claim —

1. In a fire-alarm system, the combination, with a circuit including street-boxes having manually-operated signal-sending mechanism and signal-receiving mechanism at a main or central office, of an auxiliary circuit or circuits connecting the said street-boxes with one or more stations, including in the said box or boxes an independent electro-mechanical trip or releasing device, and means for automatically restoring the same after each releasement operated by the motor of the street-box, with signal-sending apparatus at the said station or stations.

2. In a fire-alarm system, the combination, with a closed circuit including one or more

street-boxes having manually-operated signal-sending mechanism and signal-receiving mechanism located at a central or main office, of an auxiliary circuit or circuits connecting the said street-boxes with one or more stations at a distance therefrom, including in the said box or boxes an independent electro-mechanical trip or releasing device, and means for automatically restoring the same after each releasement, operated by the motor of the street-box, with signal-sending apparatus at the said station or stations.

3. In a fire-alarm system, the combination, with a circuit including street-boxes having manually-operated signal-sending mechanism and signal-receiving mechanism at a main or central office, of auxiliary circuits connecting the said street-boxes with one or more stations, including in the said box or boxes an independent electro-mechanical trip or releasing device, with means for automatically restoring the same after each releasement, operated by the motor of the street-box, means for indicating the station sending a signal, and signal-sending apparatus at the said station or stations, consisting, essentially, of a break-wheel with one or more teeth than sufficient to indicate the number of the station.

4. In a fire-alarm system, the combination, with a circuit including street-boxes having manually-operated signal-sending mechanism and signal-receiving mechanism at a main or central office, of auxiliary circuits connecting the said street-boxes with one or more stations, with signal-sending apparatus at the said station or stations, including in the said box or boxes an independent electro-mechanical trip or releasing device provided with means for automatically restoring the same after each releasement, operated by the motor of the street-box, and means for preventing an accidental release of the street-box mechanism, consisting, essentially, of a break-wheel with one or more teeth than sufficient to indicate the number of the box.

5. In an auxiliary fire-alarm circuit, one or more individual signal-sending station apparatus, and an electro-mechanical trip or releasing device in a street-box, operated by an independent motor, and means for automatically restoring the same when spent, operated by the motor of the street-box.

6. An auxiliary fire-alarm circuit including two or more stations, each having signal-sending apparatus consisting, essentially, of a break-wheel with one or more teeth than sufficient to indicate the number of the station, and an electro-mechanical trip and indicating device, and means for automatically restoring the former after each releasement, operated by the motor of the street-box.

7. In a combined fire-alarm and auxiliary system, a street-box having a wound signaling-train and a releasing detent or toggle adapted to be released by an independent motor controlled by an electro-magnet, and means for simultaneously resetting the said detent and for restoring the said independent motor when spent, operated by the motor of the street-box.

8. An auxiliary fire-alarm circuit including two or more stations, each having signal-sending apparatus consisting, essentially, of a break-wheel with one or more teeth than sufficient to indicate the number of the station, and an electro-mechanical trip or releasing device and means for automatically restoring the same when spent, operated by the motor of the signaling-train, with means for indicating the station sending a signal in a street-box.

9. An auxiliary fire-alarm circuit including several stations, each having signal-sending mechanism consisting, essentially, of a break-wheel with teeth differing in number to indicate the number of the station and with one or more extra teeth, for the purpose described, and an electro-mechanical trip or releasing device, and means for automatically restoring the same when spent, operated by the motor of the signaling-train in the street-box.

10. An auxiliary fire-alarm circuit including two or more stations, each having signal-sending apparatus consisting, essentially, of a break-wheel having one or more teeth than sufficient to indicate the number of the station, and an independent electro-mechanical escapement, and means for automatically restoring the same when spent, operated by the motor of the signaling-train, and means for indicating the station sending a signal located in the street-box.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 18th day of February, 1891.

GEORGE F. MILLIKEN.

Witnesses:
THOMAS G. MURPHY,
GEO. WILLIS PIERCE.