

No. 663,767.

Patented Dec. 11, 1900.

R. C. LIVINGSTON.
FIRE ALARM.

(Application filed Mar. 24, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1

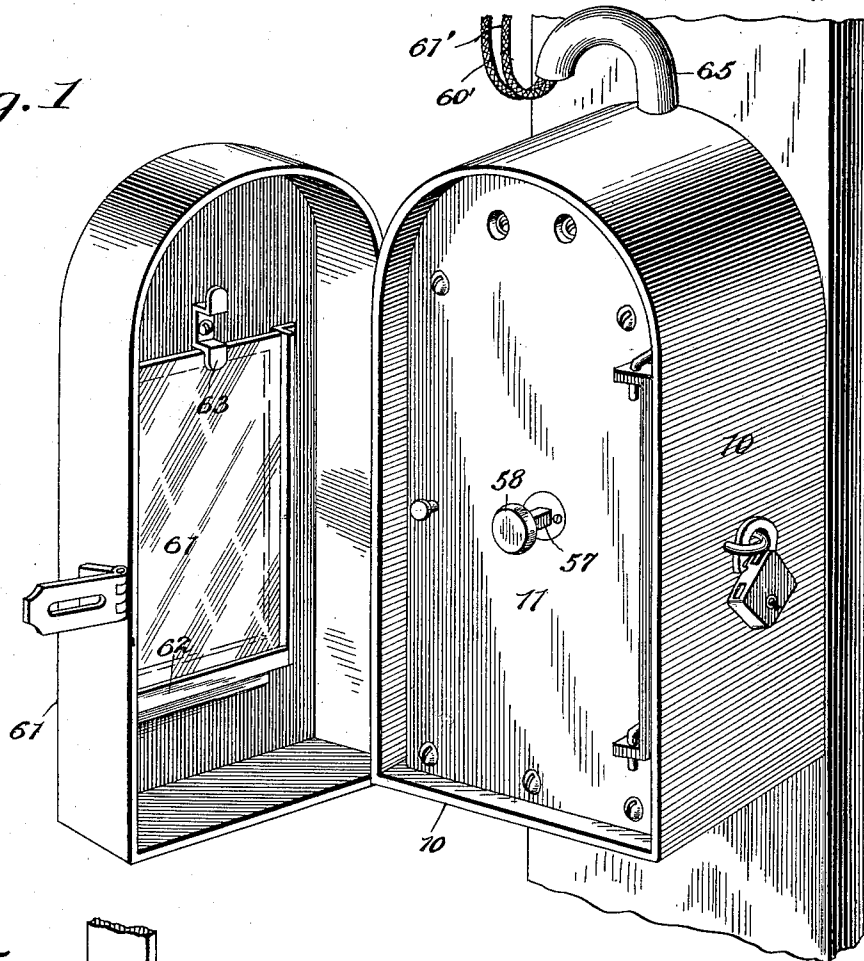


Fig. 5.

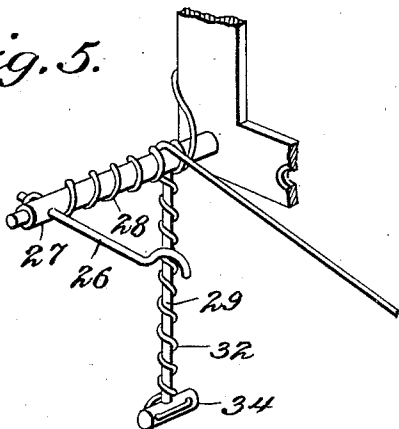
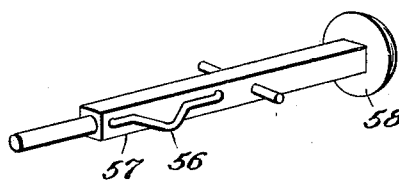


Fig. 6.



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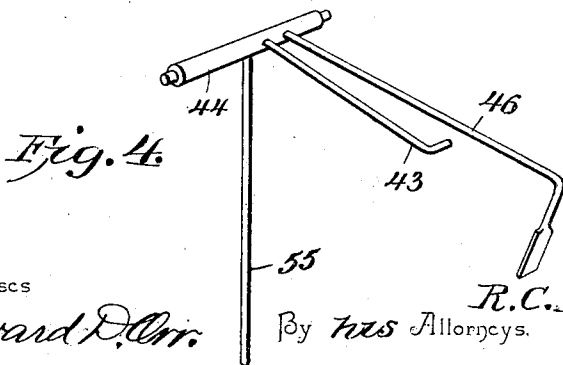
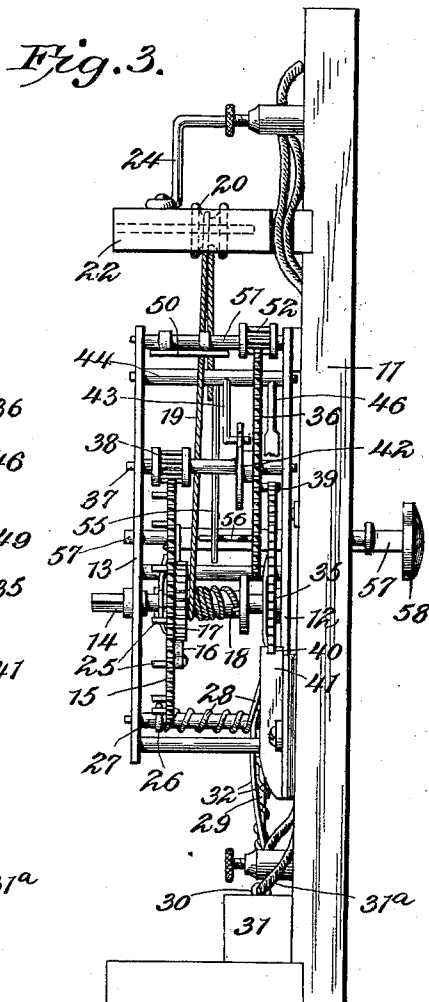
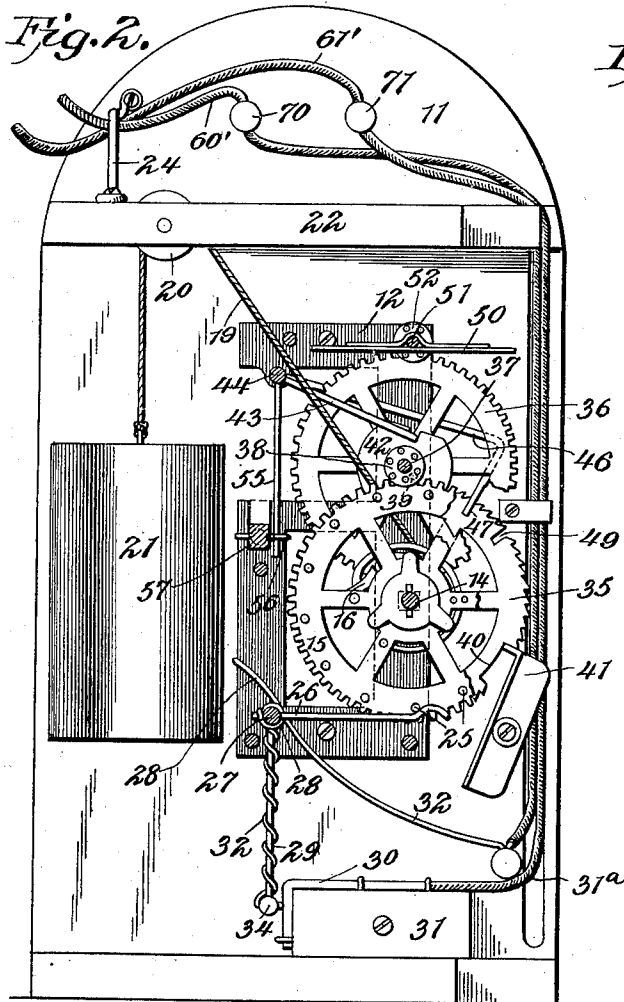
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

REASON C. LIVINGSTON, OF SPRING VALLEY, MINNESOTA.

FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 663,767, dated December 11, 1900.

Application filed March 24, 1900. Serial No. 10,071. (No model.)

To all whom it may concern:

Be it known that I, REASON C. LIVINGSTON, a citizen of the United States, residing at Spring Valley, in the county of Fillmore and State of Minnesota, have invented a new and useful Fire-Alarm, of which the following is a specification.

This invention relates to fire-alarm apparatus in general, and more particularly to the class of fire-alarm telegraphs in which the alarm is sent in to a central station through the medium of an automatic circuit-closer which governs an electric circuit including the proper and well-known instruments at the central station.

One object of the invention is, primarily, to produce a construction of automatic circuit-closer which, while possessing great efficiency, will be extremely cheap, and, furthermore, will be so simple in its construction that it will not be easily susceptible to disorder and may be quickly and easily set and released at the proper times.

A further object of the invention is to so arrange and house the circuit-closer that access thereto may be had by breaking a glass in the closure and in which a new glass may be readily put in place.

An additional object of the invention is to so arrange the parts that they will be readily accessible, whereas under ordinary circumstances the mechanism will be completely concealed and will remain so even after the glass has been broken.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a perspective view of the complete device, showing the door of the casing opened for access to the mechanism of the construction. Fig. 2 is an elevation of the mechanism of the circuit-closer, which is carried on the inner face of the door, which is shown within the casing in Fig. 1. Fig. 3 is a side elevation of the construction shown in Fig. 2. Fig. 4 is a detail perspective view showing the rock-shaft which carries the detent, the governing-arm, and the release-arm. Fig. 5 is a perspective view showing in detail the rock-shaft and the circuit-closing arm and shaft-rocking arm carried thereby.

Fig. 6 is a detail perspective view showing the push-rod for releasing the detent.

Referring now to the drawings, the mechanism of the present invention is contained in a box or casing 10, the upper end of which is preferably rounded, as shown, to facilitate the shedding of water, and which box or casing is adapted to be secured upon a post or other suitable support by means of screws passed through its back or in any other suitable manner.

The circuit-closing mechanism is mounted directly upon a board 11, which is in the form of an inner door having hinged connection with a side wall of the box, so that the door may be moved into and out of the box and simultaneously reversed. Hence when the door is moved into the box the mechanism is concealed and protected, and when it is moved out of the box its inner face is turned outwardly and the mechanism is exposed, as shown in Fig. 2 of the drawings.

The circuit-closing mechanism comprises a train of gearing which is mounted between the usual frame-plates 12 and 13 after the manner of an ordinary clock mechanism. Mounted in bearings in the plates 12 and 13 is a main shaft 14, upon which is loosely mounted a master-gear 15, carrying a pawl 16, which coöperates with a ratchet-wheel 17 upon a winding-drum 18, which is fixed upon the shaft. The outer end of the shaft 14 projects through the front plate 13 and is squared for the reception of the usual winding-key, and to the winding-drum is fixed one end of a cord 19, which passes upwardly and over a pulley 20 and has a weight 21 on its opposite end. The pulley 20 is mounted upon a shaft carried by a plate or ledge 22 upon the door or board 11 above the mechanism, the plate or ledge having a brace 24, as shown, to prevent displacement.

The master-gear 15 has a plurality of pins projecting from its front face, and these pins are adapted to engage and depress the free end of a lever 26, which is fixed to a rock-shaft 27, journaled in the plates 12 and 13, the lever being held yieldably in the path of movement of these pins by means of a helical spring 28, which encircles the shaft and one end of which is attached to the shaft,

while the opposite end is attached to the frame-plate 13. Also fixed to the rock-shaft 27 is a circuit-closing arm 29, which extends downwardly from the shaft for coöperation 5 with an electric terminal plate 30, which is mounted upon a block 31 on the board 11. The plate 30 has a conductor 31^a leading therefrom and forming one conductor of the alarm-circuit, the opposite conductor consisting of 10 a wire 32, which is wrapped around the contact-arm and is then passed through transverse perforations in the head 34 of the arm, so that said wire makes direct contact with the contact-plate. Thus as the master-gear 15 rotates the pins alternately depress and release the lever 26, the engagement of the pins with the lever acting to move the contact-arm from the contact-plate, whereas when the pins release the lever the contact-arm 20 moves to bring the wire into contact with the contact-plate, thus closing the circuit intermittently, or rather breaking the circuit intermittently, for the reason that the spring 28 acts to hold the contact-arm normally in contact with the contact-plate. It will therefore 25 be readily seen that in order to cause the mechanism to always send in the same predetermined signal (represented by breaks in the circuit) it is only necessary to proportion 30 the degree of rotation of the master-gear and the number of pins in operative positions with respect to the operating-lever 26. For this purpose there are employed two gear-wheels, of which one wheel 35 is a striking-wheel and is loosely mounted upon the shaft 35 14, while the other gear-wheel 36 is mounted upon a shaft 37, journaled in the plates 12 and 13 above the shaft 14. The wheel 36 is in the form of a gear-wheel and is fixed 40 upon the shaft, said shaft having also a pinion 38 fixed thereon, which meshes with the master-gear, so that the gear 36 is rotated by the action of the weight 21. Conversely, if the rotation of the gear 36 be stopped the 45 rotation of the master-gear will be stopped, and hence in order to limit the degree of rotation of the master-gear to give the desired number of depressions to the lever 26 it is only necessary to limit the number of rotations 50 of the gear 36. This limitation of the number of rotations of the gear-wheel 36 is effected through the medium of the striking-wheel 35, which has a limited degree of rotation, the wheel 35 being rotated from the 55 wheel 36 by engagement of a face-pin 39, which is carried by wheel 36 and engages with a single tooth at a time of the wheel 35, so that for each rotation of the wheel 36 the striking-wheel 35 is advanced one tooth. 60 When the wheel 35 reaches the limit of its rotation, the wheel 36 is of course stopped, which in turn stops the master-gear. The wheel 35 has always the same degrees of angular motion, and hence the master-gear is always 65 given the same degree of angular motion, and the same number of pins are always engaged with the lever 26 to always break

the circuit the same number of times and send in the same signal. The angular movement of the striking-wheel 35 is regulated by the 70 length of a slot 40, which is cut in the periphery thereof, and in this slot lies one end of a bent plate 41, attached to the board 11.

In order to take the strain of stopping the mechanism from the pin 39, and to thus save 75 wear and tear upon the pin and the teeth of the wheel 35, a detent-disk 42 is fixed upon the shaft 37 and has a radial slot in one flattened side thereof, this slot being positioned to receive the laterally-turned end of a detent-rod 43, which is fixed to a rock-shaft 44, 80 mounted in the plates 12 and 13. As the end of the detent, however, tends to fall into this radial slot at each rotation of the detent-disk, provision must be made to prevent this action 85 until the wheel 36 has rotated the proper number of times. This result is accomplished by attaching a second rod or arm 46 to the rock-shaft 44, the outer end of which is bent downwardly and formed with a knife-edge, 90 which drops between the teeth of the striking-wheel 35 each time the rod 43 reaches the flattened or cam edge of the detent-disk, and the knife-edge is of such length as to engage the periphery of the wheel 35 before the arm 95 or rod 43 can move into engagement with the slot of the detent-disk. When, however, the wheel 36 has rotated a proper number of times and the wheel has been correspondingly moved to the limit of its motion, the knife- 100 edge of rod 46 enters a deepened radial slot 47 of striking-wheel 35, this slot having a depth, as shown, which is sufficient to permit arm 43 to engage the slot of the detent-disk. At the opposite limit of its rotation 105 the wheel 35 has a second radial slot, as shown at 49, so that when the wheel 35 is at the point of its initial operative movement the knife-edge may enter the slot and permit arm 43 to engage the slot of the detent-disk and 110 hold the mechanism in its set position. The speed of rotation of the parts is regulated by a fan 50, mounted upon a shaft 51, journaled in the plates 12 and 13, and this shaft is rotated through the medium of a pinion 52, 115 which is in engagement with wheel 36.

In order to lift the arms 43 and 46 to initially release the mechanism to permit it to operate as hereinafter described, a lever 55 120 is fixed to the rock-shaft 44 and lies in the path of movement of a cam 56 upon a push-rod 57, which is slidably mounted in plates 12 and 13 and has its outer end provided with a knob 58, lying at the outer side of the board or door 11. 125

The operation of the mechanism is as follows: The weight 21 being raised by winding up the cord on the winding-drum 18, the wheels 35 and 36 are adjusted so that arm 43 will engage with the slot in the detent-disk and 130 the knife-edge of rod or arm 46 will engage with the slot 49. With the parts in this position they will remain at rest. The rod 57 is then pushed inwardly, so that its cam

56 passes under and engages with the lever 55, operating said lever to raise the arms 43 and 46 from the slots. The action of the weight through the medium of the cord on the winding-drum causes the several wheels to rotate and the striking-wheel 35 is advanced step by step in the direction of termination of its operative movement, the cam edge of the detent-disk in riding under the turned end of arm 43 acting to raise said arm and correspondingly move the rock-shaft to raise the knife-edge of arm 46 from the teeth of striking-wheel 35. This operation of the parts continues until the wheel 35 has reached the limit of its operative movement, when the knife-edge enters the slot 47 to permit arm or rod 43 to engage the slot of the detent-disk, and the mechanism is stopped.

The wheel 35 is loosely mounted on shaft 14, and in resetting the mechanism it is only necessary to operate shaft 44 to raise the knife-edge from the slot 47, when wheel 35 may be rotated reversely to position the parts as originally. The drop of the weight may be sufficient to insure several operations of the mechanism with one winding.

The formation of the slot 40 and the placing of the coöperating plate 41 permits the accurate adjustment of the striking-wheel 35 to set the mechanism, and it will of course be understood that by lengthening the slot 40 and further and correspondingly separating slots 47 and 49 the master-wheel may be given a greater degree of angular motion and the circuit broken a greater number of times. Furthermore, the pins 25 may be positioned to ring different combinations and various modifications of the mechanism may be made.

Access to the push-rod 57 is had through an opening in the outside cover 60 of the box or casing 10, this cover or door being attached by means of hinges and having a hasp and lock, as shown. The opening of the door is normally closed by means of a glass 61, which is held removably in place by a bottom strip 62, which incloses the lower edge of the plate, and by side strips which lie against the side edges of the glass plate. The upper edge of the glass plate is engaged by a turn-button 63, as shown. When it is desired to send in the alarm, the glass is broken and the push-rod is operated. The conductor-wires are led outwardly through a curved pipe 65, which is mounted upon the upper end of the box and has its free end disposed downwardly, whereby rain-water and other moisture that may run down the wires will not gain access to the box.

In practice the mechanism may be placed in a box of any specific style preferred, and any suitable materials and proportions may be employed for the various parts without departing from the spirit of the invention. Furthermore, it will be noted that should the rod 57 be drawn outwardly after being pushed inwardly to send in an alarm and after the alarm has been sent in the portion 56 will

again engage the rod 55 to release the mechanism. At this time, however, the striking-wheel 35 is at the limit of its motion, owing to the engagement of the stop 41 with the notch or recess 40, and hence when wheel 36 begins to rotate the pin 39 moves into engagement with striking-wheel 35 and is held thereby against further movement, and a second alarm cannot be sent in until the box is unlocked and the apparatus again set, the striking-wheel 35 being moved to its initial position.

The portion 24, while acting as a brace of the part 22, acts primarily to confine the leading-in wires 60' and 61', which lead from the line to the instrument and are connected at their inner ends to posts 70 and 71, to which the wires 32 and 31^a are attached. The keeper or brace 24 is located on the rear face of the inner door and adjacent the hinge edge thereof and prevents the slack of the wires from dropping down and into the mechanism when the door is closed, this slack being necessary to permit opening of the door, as will be readily understood.

What is claimed is—

1. A device of the class described comprising a train of gearing including a wheel provided with pins, a circuit-closer including a movable member lying in the path of the pins for engagement and operation thereby, a detent-disk operatively connected with the train, a detent for engaging the detent-disk to stop the operation of the train, a striking-wheel operable by the train, and a governing-arm connected with the detent and disposed for coöperation with the striking-wheel to govern the coöperation of the detent and detent-disk, said striking-wheel being movable independently of the train for return movement after each operation without operating the circuit-closer.

2. A device of the class described comprising a train of gearing and a movable circuit-closing member in operative relation thereto, a detent-disk operatively connected with the train, a detent for engaging the detent-disk to stop the operation of the train, a striking-wheel operable by the train, and a governing-arm connected with the detent and disposed for coöperation with the striking-wheel to govern the coöperation of the detent and detent-disk, said striking-wheel being mounted for movement independently of the train, whereby it may be returned after each operative movement and without operating the circuit-closer.

3. A device of the class described comprising a train of gearing including a circuit-closer-operating wheel, a detent-disk operatively connected with the train, a detent for engaging the detent-disk to stop the operation of the train, a striking-wheel operable by the train and having radial slots separated by an interspace corresponding to the angular operative movement of the circuit-closer-operating wheel, a governing-arm connected with the detent and disposed in oper-

ative relation to the striking-wheel to enter the slots of the striking-wheel and permit engagement of the detent with the detent-disk, means for limiting the angular movement of the striking-wheel to aline the slots alternately with the engaging portion of the governing-arm, said striking-wheel being movable independently of the train, and a movable circuit-closing member in operative relation to the circuit-closer-operating wheel.

4. A device of the class described comprising a train of gearing including a master-gear having pins, a rock-lever in the path of movement of the pins for operation thereby, a contact-arm connected with the lever, a contact-plate with which the arm is in normal contact, a detent-disk connected with the train, a detent for engagement with the disk, a striking-wheel for operation by the train, a governing-arm connected with the detent and disposed for coöperation with the striking-wheel to govern the coöperation of the detent and detent-disk, a release-lever connected with the arm and detent to move them simultaneously from the striking-wheel and disk, and a push-rod having a cam for engagement with the release-lever to operate it.

5. A device of the class described comprising a casing having a reversible door supporting a train of gearing including a master-gear having pins, a rock-lever in the path of movement of the pins for operation thereby, a contact-arm connected with the lever, a contact-plate with which the arm is in normal contact, a detent-disk connected with the train, a detent for engaging the disk, a strik-

ing-wheel in operative relation to the train, a governing-arm connected with the detent and disposed for coöperation with the striking-wheel to govern the coöperation of the detent and the detent-disk, a release-lever connected with the arm and detent to move them from their engaging positions, and a push-rod for operating the release-arm, the striking-wheel being movable independently of the train, whereby it may be returned after each operative movement when the detent and governing-arm are raised from their engaging positions.

6. A device of the class described comprising a train of gearing having operative connection with a movable circuit-closing member and including a striking-wheel having a limited movement and means for driving the train, means operated by the train for intermittent engagement and disengagement with respect to the striking-wheel to permit movement thereof step by step, said means being adapted to rest in engagement with the striking-wheel to lock the train against operation when the striking-wheel is at one limit of its movement, and means for stopping the striking-wheel at the opposite limit of its movement.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of witnesses.

REASON C. LIVINGSTON.

Witnesses:

R. J. PARKER,
J. B. VIALL,
FAY B. VIALL.