(No Model.)

G. L. FOOTE.

FIRE ALARM BOX.

No. 415,629. Patented Nov. 19, 1889.

Fig. 1.

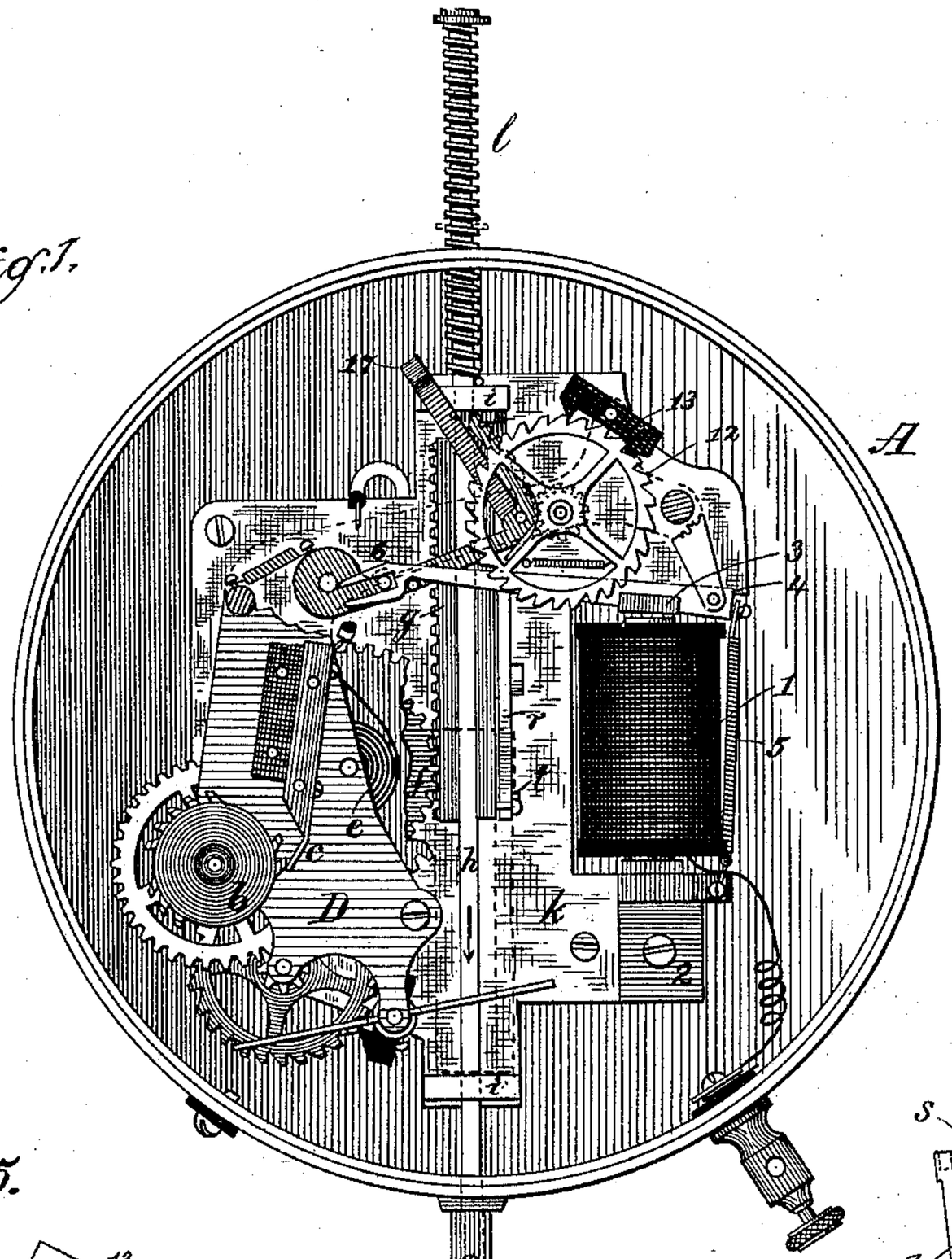

Fig. 5.

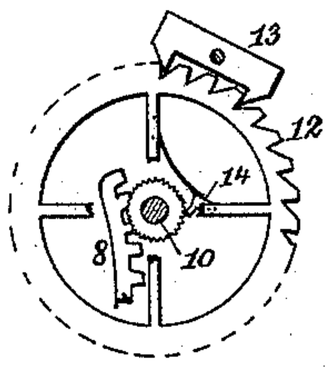

Fig. 2

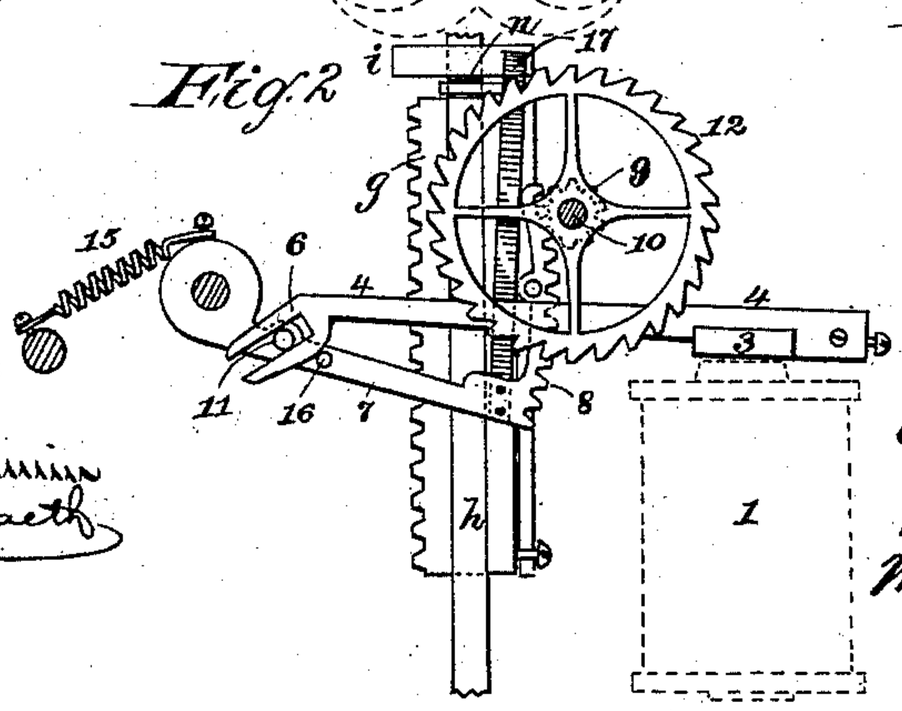

Fig. 4

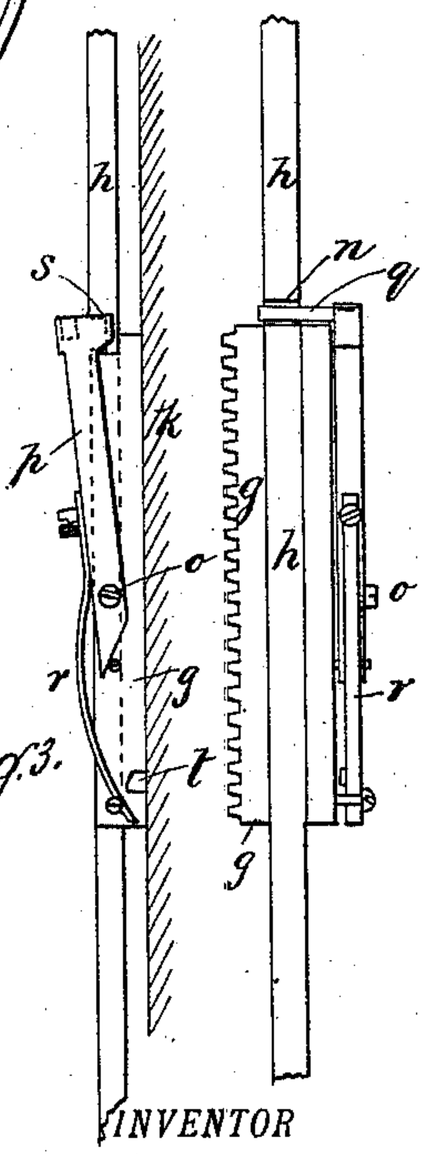

Fig. 3.

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FIRE-ALARM BOX.

SPECIFICATION forming part of Letters Patent No. 415,629, dated November 19, 1889.

Application filed January 30, 1888. Serial No. 262,368. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. FOOTE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Fire-Alarm 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 appertains to make and use the same.

This invention relates to fire-alarm boxes of that class which are known as "non-interference"—that is, a fire-alarm box so designed and organized that, in a circuit containing several boxes, when one is set to send in an alarm to the central office the remaining boxes are rendered inoperative so far as concerns their ability to transmit signals over the circuit.

All fire-alarm boxes, whether self-winding or otherwise, require some sort of manipulation of one or more parts of the mechanism in order to send signals over the circuit. In such boxes as are self-winding a train of wheels connects with a driving-spring, which is normally relaxed and is wound up by a "pull," lever, or crank, and when released rotates a make and break wheel in the circuit. In the other type of the box the spring is wound at regular intervals, and is made long enough to store energy for many repetitions of the act of sending in signals. In these the gearing is locked by various means, and is released and the signals sent over the line by pulling a lever or other means of unlocking the train.

The invention consists in the construction and arragement of devices substantially as hereinafter fully described and claimed.

In the following description I refer to a specific form which I have designed for a closed-circuit system; but I wish here to state that the mere form may be varied to suit the style of box to which it is to be applied, and in many cases must necessarily be modified.

In the drawings herewith, Figure 1 is a face view of a "closed-circuit" style of box, "self-winding," and embodying my invention. Fig. 2 is a detail elevation illustrating the essential parts embodying the non-interference features. Fig. 3 is a side view of the pull-rod and detachable rack. Fig. 4 is a face view of same, and Fig. 5 is a partial view of the retarding-wheel, hereinafter explained.

A designates the signal-box, which is of the usual circular form and contains the make and break wheel *b* and brush *c*, both in circuit in the ordinary manner. The wheel-train D takes its movement from a coiled spring *e*, which is wound by the rotation of the pinion *f*, and this is in this case effected by the downward movement of the sliding rack *g*, which meshes therewith. Rack *g* is grooved longitudinally in its face, and in the groove is fitted the sliding rod *h*, which passes through upper and lower guides *i i*, projecting from the back plate *k* of the clock-train.

Rod *h* projects upwardly through box A, and is surrounded by a retractile spring *l*, which draws the rod to its upward limit. At the lower end rod *h* passes downwardly through box A, and terminates in a ring or finger-piece *m*, whose shoulder is cushioned by a gum washer, and insures the stopping of the rod at a regular point. At a point corresponding to the upward limit of motion of the upper end of rack *g* the rod *h* is notched in its face, as at *n*. By a lateral pivot *o* on the side of rack *g*, I mount the lever *p*, having at its upper end a pin *q*, adapted to enter notch *n* of rod *h* and lock the rack and rod together. At its lower end lever *p* is controlled by a light spring *r*, whose tension is exerted to draw the lever and its pin *q* out of the notch *n*. The upper end of the lever *p* at its back has the projecting toe *s*, which, when the rod and rack interlocked are drawn downwardly by the finger-piece *m* about to the limit, strikes a pin *t*, projecting from back plate *k*. This forces the lever and pin out of notch *n*, and the rod *h*, being thus released, flies up to normal position, and the rack *g*, having engaged pinion *f* and wound the spring *e*, returns at the speed permitted by pinion *f*. It will thus be understood that unless the finger *g* is pressed into the notch *n* the rod *h* will be perfectly free, and can be moved up and down without moving the rack, and by the operation of my invention, when one box is "pulled" the very first act it performs

is to release the fingers q in all other boxes of the circuit, so that even if they are opened and the rod h pulled down no movement of their racks can be accomplished, and hence no signals can be sent on the line by any box but the one in operation and in possession of the line, as it were. It remains then to arrange the devices so that the alternate attractions and retractions of the magnet-armature in the boxes, due to the impulses caused by the make and break wheel, shall not at corresponding intervals set the fingers q into the notches n. This I accomplish in a very reliable manner by connecting each armature with a retarding device, which will compel so slow a movement of the armatures in attracting that they do not quite reach the resetting-point before the circuit is opened by the make and break wheel, and this retardation is effectual until the wheel b of the signaling-box has stopped on closed circuit long enough to permit the armature to get a full stroke, at which point all the rods h are again interlocked with racks g, and each box is restored to operative condition. The devices for this purpose are as follows:

The magnet 1, of usual form, is fixed in suitable position on a bracket 2 to the frame k. Above this the armature 3 is fixed to lever 4, pivoted in the frame and drawn upward by the coil-spring 5, as shown. The other end of lever 4 is extended and terminates in a fork 6, having a slight downward inclination. A lever 7 is suitably pivoted in the frame k on an axis slightly beyond the end of fork 6, and returns toward armature 3, and ends in an upwardly-extended segment-gear 8, sprung from the pivotal center of lever 7 and meshing with a small pinion 9 on an arbor 10. Levers 4 and 7 are connected into a compound system by a pin 11 on lever 7, playing in the fork 6. On arbor 10, I fasten a scape-wheel 12, and pivot a pallet 13 on frame k, so as to engage with wheel 12, as shown. The pallet 13 may be loaded or otherwise governed, as by a fan, according to the rate of speed desired to be given its oscillations. Pinion 9 has a fine ratchet-rim engaged in one direction by a light spring-pawl 14, pivoted on scape-wheel 12, the relations being such that no engagement takes place between pinion 9 and wheel 12 on the upward movement of segment-gear 8; but on the downward movement of the latter, due to the attraction of armature 3 by magnet 1, the pinion 9 engages wheel 12 and the downward movement is controlled by the escapement 12 and 13, whose rate may be moderate or very slow, according to requirements. The upward movement of the segment-gear 8 is effected by a small coil-spring 15, arranged as shown, or by a tail-weight, and its upward movement is limited by the pin 16 on lever 7 striking the lever 4. It will thus be seen that the retractile movement of armature 3 is unrestricted, but that its attractive motion is retarded by the escapement 12 and 13. To compensate for the increasing pull exerted on the armature as it approaches the magnet, the fork is used, which increases the resistance by changing the leverage on pin 11, and this resistance is still further increased by inclining the fork. The practical result is a substantially uniform speed of the segment-gear 8. To the lever 7, just back of gear 8, I attach a spring-arm 17, which is so arranged that its outer end sweeps over and presses upon the upper end of lever p, and forces its pin q into notch n; but this takes place only at the extreme downward limit of movement of the segment-gear and the actuating-armature 3.

In the given case of a closed-circuit system, the result is, all armatures being normally attracted, the levers p will all have their fingers resting in the notches n, thus locking the pull-rods h and racks g together into operative condition. When, now, the rod h of any one box is pulled down, spring e is wound up and pin t automatically disengages the rack g, which begins to slowly ascend, and make and break wheel b starts into action. At the first break of circuit all armatures 3 are released and all segments 8 instantly fly to their uppermost position, thereby allowing springs r to lift pins q out of notches n; hence on the first break of circuit following the pulling of one of the rods h, all the signaling mechanism of the boxes are thrown out of engagement with their manipulating mechanism, and though the rods h may be pulled down freely, they are incapable of operating the signaling mechanism or in any way disturbing the circuit.

During the short period of closure of circuit by the make and break wheel b of the box now signaling the spring-arms 17 of all the boxes are drawn downwardly; but their motion downwardly is retarded by the escapement 12 and 13, as described, and the latter is so timed with respect to the length of said periods of closed circuit that the spring-arms 17 at each movement downward do not reach the point when they would press the levers p into engagement with the rods h; hence during the time occupied by the make and break wheel in sending its series of signals, all other boxes are rendered inoperative for sending in signals or disturbing the circuit. When the wheel b has completed its signals and comes to rest on closed circuit, the armatures 3 are all attracted to the full limit of their movement, and all the arms 17 are brought down to such position as to press the levers p on racks g into engagement with rods h, and then all the boxes are once more in normal condition and any one can be operated.

Obviously the invention may be readily adapted to various types of manipulating mechanism. It is positive in action and does not depend for success on any electrical switching, shunting, or cutting-out devices. The circuit remains in one fixed condition, so

that there are no variations of resistance to provide for.

In constructing a number of boxes in accordance with this invention they will of course be so adjusted relatively that the make and break wheels will be rotated in substantial synchronism, and, as my object is to prevent the engagement of the manipulator with the signaling-train and during the normal rotation of the make and break wheel of any given box, it is of course desirable that the retarding mechanism which acts during the attractive stroke of the armature should likewise be synchronized. To accomplish this properly, the retarding mechanism and make and break wheel in each box will be so adjusted with reference to all the other boxes that during the periods of make on any one box the attraction of the armature in all other boxes will be retarded sufficiently to prevent their effecting the engagement of the manipulating mechanism with the signaling train, so that this engagement can take place only when the make is of longer period than the normal make used in the transmission of signals.

I claim as my invention—

1. In a fire-alarm box, the combination of a make and break wheel and motor therefor, a manipulating device for said motor, a controlling-magnet permanently in the circuit, provided with a movable armature having retarding mechanism, and engaging devices interposed between said motor and manipulating device and controlled by said armature, the parts being so arranged that when the armature is released its initial retraction releases the engagement between the motor and manipulating device.

2. In a fire-alarm box, the combination of a make and break wheel and motor therefor, a manipulating device adapted to set said train in motion, a controlling electro-magnet permanently in the working-circuit, a movable armature for said magnet, and engaging devices adapted to effect engagement between said motor and manipulating device when the armature is at full stroke, and a retarding mechanism connected to said armature and timed relatively to the periods of make and break, substantially as described, whereby in signaling from the box the first break acts to release the armatures of all other boxes and throw their manipulating devices out of engagement with their motors and the retarding mechanisms prevent a full stroke of the armatures until the circuit has been closed for a predetermined length of time.

3. In a fire-alarm signal-box, the combination, with the make and break motor-gear *f* and operating-rack *g*, having pivoted lever *p*, carrying pin *q*, and notched pull-rod *h*, of the magnet 1, pivoted armature 3, and spring-arm 17, adapted to be reciprocated by said armature, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEO. L. FOOTE.

Witnesses:

ELI LONG,

GEORGE P. FOULK.