

C. F. BURROUGHS.
FIRE ALARM BOX.
APPLICATION FILED APR. 12, 1912.

1,051,946.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.

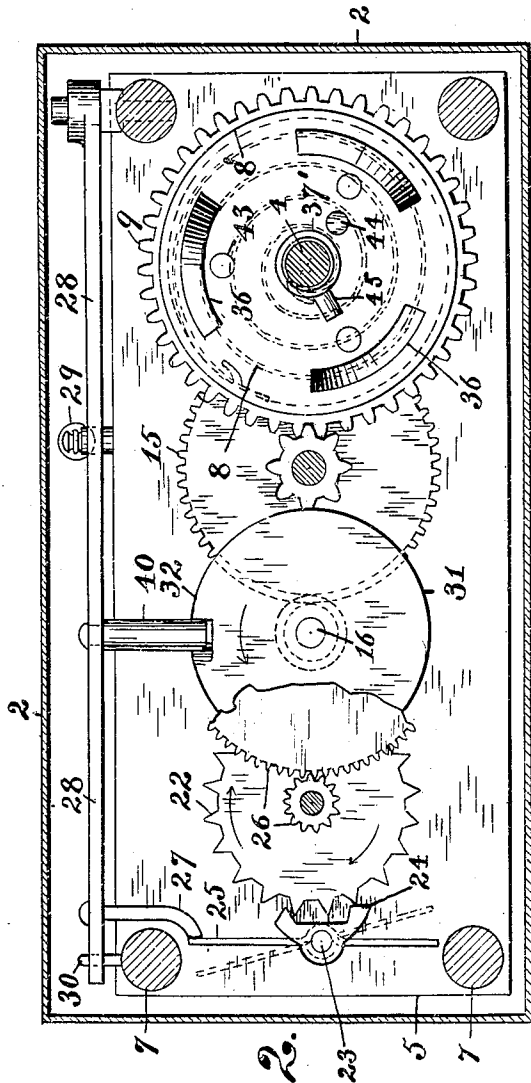


Fig. 2.

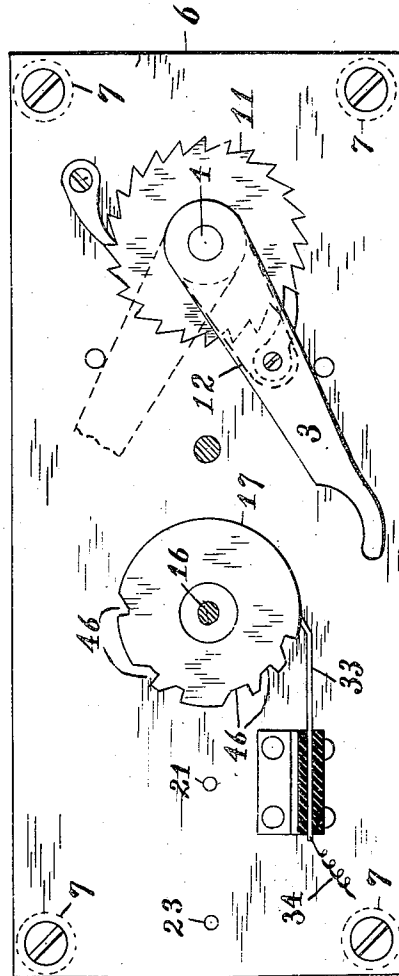


Fig. 1.

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L. Lee.
Walter Greenbaum.

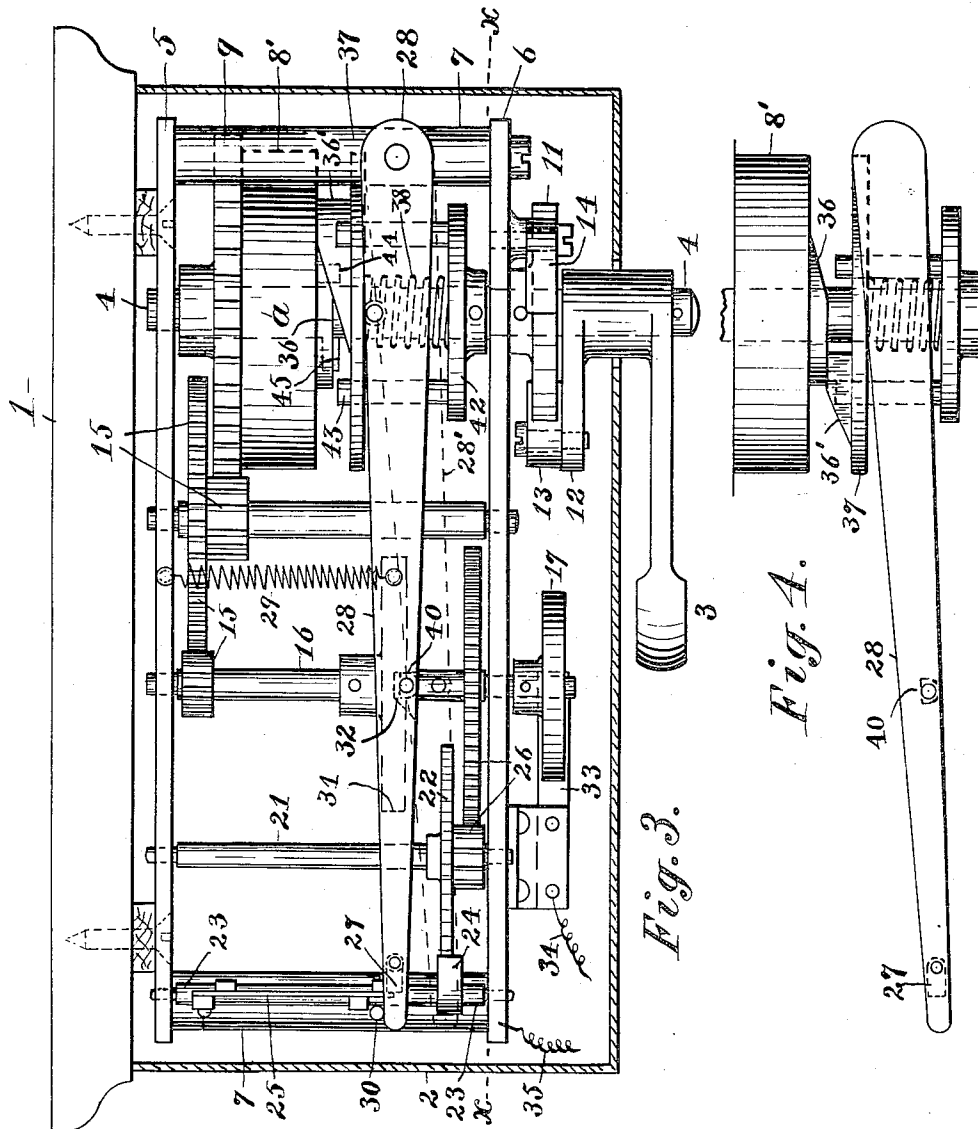
Inventor
Charles F. Burroughs, per
Thomas S. Crane, Atty.

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UNITED STATES PATENT OFFICE.

CHARLES F. BURROUGHS, OF EAST ORANGE, NEW JERSEY.

FIRE-ALARM BOX.

1,051,946.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed April 12, 1912. Serial No. 690,397.

To all whom it may concern:

Be it known that I, CHARLES F. BURROUGHS, a citizen of the United States, residing at 65 Prospect street, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Fire-Alarm Boxes, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in fire alarm boxes of that class which is self-winding, that is, it does not require winding periodically by an inspector, but is wound up automatically by the normal actuation of the pull-lever.

The particular purpose of the invention is to devise a self-winding fire alarm box which is foolproof, and this purpose is accomplished chiefly by connecting the winding-lever of the box to the inner end of a clock-spring, while the gear-train for actuating the signal-wheel is driven from the outer end of the spring. The outer end of the spring may be connected to a drum or to any part of a cog-wheel for propelling the gear-train, and a stop is provided to prevent any movement of the gear-train until the lever is pulled. The connection of the pull-lever to the stop for retracting the latter is preferably effected through a cam movable with the said drum or cog-wheel, and operating when the lever is pulled to retract the stop and initiate the movement of the gear-train, which continues until the reaction of the cam permits the stop to arrest the mechanism. The motive power which is utilized to propel the gear-train may consist of a spring, a weight, or any other motive-power which is reenergized by the pull-lever at each movement. The construction is such that the sending of the signal is certain if the pull-lever is operated.

Inasmuch as a fire alarm box is generally used by people unfamiliar with mechanical devices, it is most essential that the manipulation required of the user, to effect the transmission of an alarm, shall be of the simplest character. The boxes in which the actuating spring is wound by an inspector permit of such a simple manipulation; as the train of spring-moved gearing need only be released for action by the mere downward movement of a lever projecting from the box; but this type of box is open to the very grave objection that its main spring is

necessarily under great tension normally. The breakage of such springs is therefore by no means rare, especially in the winter when the temperature falls very low, and the breakage of such a spring will not be detected until the box is inspected, which is usually once a month. The user would not be aware that the spring was broken, and great damage might be caused by a fire, through the failure of the alarm to be transmitted, if the lever upon such a box be actuated. Furthermore, with boxes wound by an inspector, a very rigid system of supervision must be maintained to make sure that every box is sufficiently wound after each actuation to transmit the signal safely, otherwise it might happen that the box would not operate if the spring were run down. The disadvantages are therefore greater than the advantages in the use of the box wound by an inspector, and it is the purpose of my invention to provide a self-winding box, which is as simple to manipulate and as certain in its action as the box wound at intervals by an inspector.

Heretofore, in self-winding alarm boxes the mechanism for transmitting the signal has failed to operate under the following conditions: First, when the operator or user neglected to let go of the pull-lever after pulling it down. No transmission of the signal would result, in such case, as the user held the main spring from acting upon the gear-train until the pull-handle was released. Second, when the user pulled the handle up and down repeatedly; in this case a mutilated signal would be transmitted. Third, when the operator did not pull the handle down a sufficient distance, in which case no signal would be given. My improvements wholly prevent such failure to operate, as the first cause of failure does not exist, because the pulling down of the pull-handle is arranged to wind the spring and yet have the spring-drum and the train of gearing connected therewith free to rotate during the pulling movement. In my invention, the second cause of failure does not exist, as my spring-drum rotates independently of the handle's movement. The train of gearing is constructed so that when the handle is moved throughout its full intended stroke the gearing produces four rotations of the signal disk and thus repeats the signal four times. The connections from the pull-handle to the stop mechanism

are such that if the handle be moved only one-quarter of its proper stroke, the train of gearing will be released for operation and the signal-disk will be rotated once. Consequently, a comparatively slight movement of the pull-handle, such as any user would be certain to produce, is sufficient in my construction to release the train of gearing and send the desired signal, and I have therefore minimized the liability of failure from the third cause mentioned.

In the accompanying drawing, Figure 1 is a front elevation of the mechanism without the inclosing casing; Fig. 2 is a vertical section of the same on line $x-x$ in Fig. 3; Fig. 3 is a plan of the same with the top of the casing broken away, and the stop mechanism in operation; Fig. 4 is a plan of the stop-lever, and the mechanism for shifting the same, in operation.

The mechanism is mounted upon a base-plate 1 and inclosed in a suitable casing 2 which is merely indicated in the drawing. Ordinarily the casing would be again inclosed in an ordinary fire alarm pillar box and access to it secured only through the door upon the pillar. The opening of such door would expose merely the pull-handle 3 carried by the winding-spindle 4. Such spindle is journaled in frame-plates 5 and 6 connected by posts 7 in the usual manner. The top post is omitted at the left of Fig. 3. A drum 8' carrying a main gear-wheel 9 is mounted to turn upon the spindle, and the ends of the clock-spring 10 are secured respectively to the spindle and the inside of the drum, as shown in Fig. 2, so that the turning of the spindle within the drum puts the spring 8 under tension, while the drum tends to rotate at all times under the impulse of the spring. It is common to connect the outer end of such a spring directly to a stud upon the main gear-wheel, and the drum is not therefore essential for the propelling of the train by the spring. The drum performs additional functions in my construction; by carrying the cams which move the gear-train stop. A pin 44 is projected from the end of the drum and a pin 45 projected radially from the shaft 4 to engage the same when the drum is turned nearly one rotation. These pins prevent any possible overwinding of the spring, and this safe-guard is useful to prevent any overwinding of the spring by repeated movements of the pull-lever. A ratchet-wheel 11 is attached to the spindle, and an arm 12 is attached to the pull-lever 3 and carries a pawl 13 which engages the ratchet-wheel when the lever is pushed downwardly. The detent 14 locks the ratchet-wheel and holds the spindle in the position to which it is turned by the pull-lever.

The wheels of the gear-train are so proportioned that the spring will turn the sig-

nal-wheel one revolution for the movement of each tooth upon the ratchet-wheel by the pull-lever, and as the detent 14 locks the ratchet-wheel after each tooth movement, it is evident that the spindle cannot turn backwardly if the pull-lever be released before it has made its full normal movement. Through intermediate gearing 15, the spring-drum 8' is connected with the shaft 16 upon which the signal-wheel 17 is secured. The shaft 16 is connected by gears 26 to a shaft 21 carrying a scape-wheel 22. A rock-shaft 23 carries a pallet 24 in engagement with the scape-wheel, and also wings 25 which oscillate with the rock-shaft and regulate its speed of movement. The wings are secured to the spindle so as to hold a fixed position thereon. A pin 27 on a stop-arm 28 is provided to engage the wings and normally hold the entire train of mechanism from operation. A stop-disk 31 having a notch 32 is secured to the shaft 16, and revolves in unison with the signal-wheel 17. The purpose of this arrangement is to insure the stopping of the signal-wheel in a predetermined position. An insulated spring 33 bears upon the signal-wheel, and electric circuit connections 34 and 35 are provided, as shown in Fig. 3. The circuit is normally closed through the spring and signal-wheel.

The wheel is shown with a series of notches 46 disposed to interrupt the circuit and thus send the desired signal for each rotation of the signal-wheel.

The stop 27 and a dog 40 are carried by a locking-arm 28 shown pivoted upon one of the posts 7 and extended across the winding-spindle and all of the gear-shafts, and pressed by a spring 29 normally toward a pin 30 in the post 7 over the rock-shaft 23. The normal position of the arm 28 when in contact with the pin 30 holds the stop 27 in engagement with the upper corner of the wing 25, and the dog 40 in engagement with the notch 32 of the disk 31. Means are provided upon the spring-drum and the winding-spindle to move the locking-arm laterally when the pull-lever is depressed, so as to release the signal-wheel and the escapement mechanism. When this is once effected, nothing can prevent the transmission of the signal by the wheel 17. Every time the pull-lever is used, the spring is re-wound, and the drum cannot therefore fail to operate the signal mechanism. To move the locking-arm and retract the stop from the wing 25, a movement longitudinally of the winding-spindle is required, and this is conveniently effected by cam-segments 36 upon the face of the winding-drum, and a disk 37 movable upon the spindle and having seats 36' pressed normally toward the cams 36 by a spring 38. The cam-segments and seats 36' have inclined faces joined to

plane-faces. The disk is driven by a clutch-plate 42 attached to the spindle and having pins 43 fitted to holes in the disk, the disk being held parallel with the clutch-plate by the support of its three seats 36' upon the three cams 36. The disk moves the locking-arm by contact with a pin 37' projecting therefrom.

The pull-lever, as shown in Fig. 1, is adapted to turn the ratchet-wheel 11 about sixty degrees, which embraces four teeth upon such wheel, and the cams 36 are proportioned, when moved a little over fifteen degrees or the space of one tooth, to move the locking-lever 26 as far as is necessary to clear the stop 27 and the dog 40 from the parts which they engage. It will thus be seen that the ratchet-wheel 11 must be moved at least one tooth ahead before the gear-train can be released at all. When the pull-lever is actuated further, the plane-faces of the cams 36 and seats 36' slide upon one another by the rotation of the disk 37 with the spindle, until they are in the position shown in Fig. 4; but no further motion of the lever 28 results during such sliding movement. The rotation of the drum when the stop is retracted, restores the disk 37 and locking-arm gradually to their initial relations, but has no effect in moving the locking-arm 28 until the signal-wheel has been turned at least three times. If the pull-lever be depressed only enough to move the ratchet-teeth one tooth, the arm 28 would still be forced to perform its normal movement, and would release the signal-wheel and permit it to make one revolution before the rotation of the spring-drum restores the normal relation of the cam and the disk 37.

It may be observed that the signal-wheel must always be stopped in the same position, as otherwise it might stop with the spring 33 opposite a notch in the signal-wheel, in which case the circuit would remain open, and no signal could be sent or received from other boxes on the same circuit, it being usual in fire alarm practice to connect a number of boxes in series in one circuit for reasons of economy in line-construction. The desired regulation of the signal-wheel is effected positively with the construction shown, as the return of the arm 28 to its normal position is conditional upon the dog 40 coming opposite the notch 32 in the disk 31. When the notch 32 coincides with the dog 40, the dog falls into the notch under the impulse of the spring 29, and the stop 27 simultaneously arrests the entire train. The signal-wheel is thus always stopped in the required position to maintain a closed circuit. If the pull-lever has been pulled all the way down, four revolutions of the signal-wheel will result, as the seats upon the disk 37 will not regain their initial re-

lation to the drum 8 until the signal-wheel is making its fourth rotation, during which critical period the notched disk 31 prevents premature stopping of the mechanism, as just described.

From what has been explained, it will be seen that the ratchet-wheel may be rotated step by step by successive actuations of the pull-lever. It will also be seen that if the lever be so actuated, the spring of the gear-train will be wound up successively, and that if the train of gearing were not restrained by the stop 27 arresting the wing 25, such drum would be propelled by the spring until it ran down, and the signal-wheel would operate to send the signals, even during the time the pull-lever was being manipulated. It therefore follows that, so far as the transmission of the signals is concerned, it is immaterial how the pull-lever be manipulated, as a rotation of the signal-wheel results from any material movement of the pull-lever.

It is immaterial what motive power be employed to drive the gear-train provided it is adapted to be energized or rewound by each movement of the pull-lever, and to operate independently of the pull-lever as soon as the stop 27 is retracted. It will be understood that with the construction shown, the first portion of the pull-lever's movement operates to retract the stop, and thus to liberate the train for operation under the impulse of the motive power. When the gear-train and signal-wheel are started in operation by the retraction of the stop, the motive power thereafter operates independently of the pull-lever to rotate the signal-wheel during any further movement of the lever in either direction. The holding of the lever in its lower position, or the rising of the lever before it has been fully depressed, does not in any way interfere with the action of the motive power in propelling the signal-wheel. The connection of the cam 36 with the spring-drum or main cog-wheel causes the stop to arrest the action of the train after the signal-wheel has made a definite number of revolutions, and as this is an advantageous arrangement I have made a special claim thereto.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a self-winding fire alarm box, the combination, with the signal-wheel and a power-driver for propelling the same, of a stop for restricting the operation of the signal-wheel, a pull-lever with connections for energizing the driver, means actuated by the first movement of the pull-lever to retract the stop, and means actuated by the driver while independently propelling the signal-wheel, to gradually move the stop into operative position to arrest the signal-wheel.

2. A fire alarm box having rotatable

mechanism for transmitting a signal, a drum geared to such mechanism, a winding-spindle carrying the drum and connected thereto by a spring, a stop for restraining the signal mechanism, a ratchet-wheel secured to the winding-spindle, a pull-lever pivoted upon the spindle and having a pawl to engage such ratchet-wheel and rewind the spring, a detent for holding the ratchet-wheel when moved, and means carried by the spindle for retracting the stop when oscillated by the pull-lever.

3. A fire alarm box having rotatable mechanism for transmitting a signal, a drum geared to such mechanism, a winding-spindle carrying the drum and connected thereto by a spring, a stop for restraining the signal mechanism, a ratchet-wheel secured to the winding-spindle, a pull-lever pivoted upon the spindle and having a pawl to engage such ratchet-wheel and rewind the spring, a cam attached to the drum, a disk rotatable with the spindle and longitudinally movable upon the spindle, and pressed normally toward the cam, and a connection from such disk to the stop to

retract the stop when the spindle is oscillated by the pull-lever.

4. A fire alarm box having a rotatable signal-wheel, a scape-wheel geared to the same and provided with a pallet, a stop to restrict the pallet movement, a spring-drum and gearing connecting it to the signal-wheel, a winding-spindle with spring connecting it to the drum, a pull-lever with means to oscillate the winding-spindle and rewind the spring, means carried by the spindle to retract the stop, a cam upon the drum for moving such means, the retracting means operating when fully moved by the cam to hold the stop retracted during several revolutions of the signal-wheel, and operating when partially moved by the cam to permit at least one rotation of the signal-wheel.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES F. BURROUGHS.

Witnesses:

THOMAS S. CRANE,
J. WALTER GREENBAUM.