(No Model.) 3 Sheets—Sheet 1.

F. F. LOOMIS.

NON INTERFERING FIRE ALARM BOX.

No. 461,169. Patented Oct. 13, 1891.

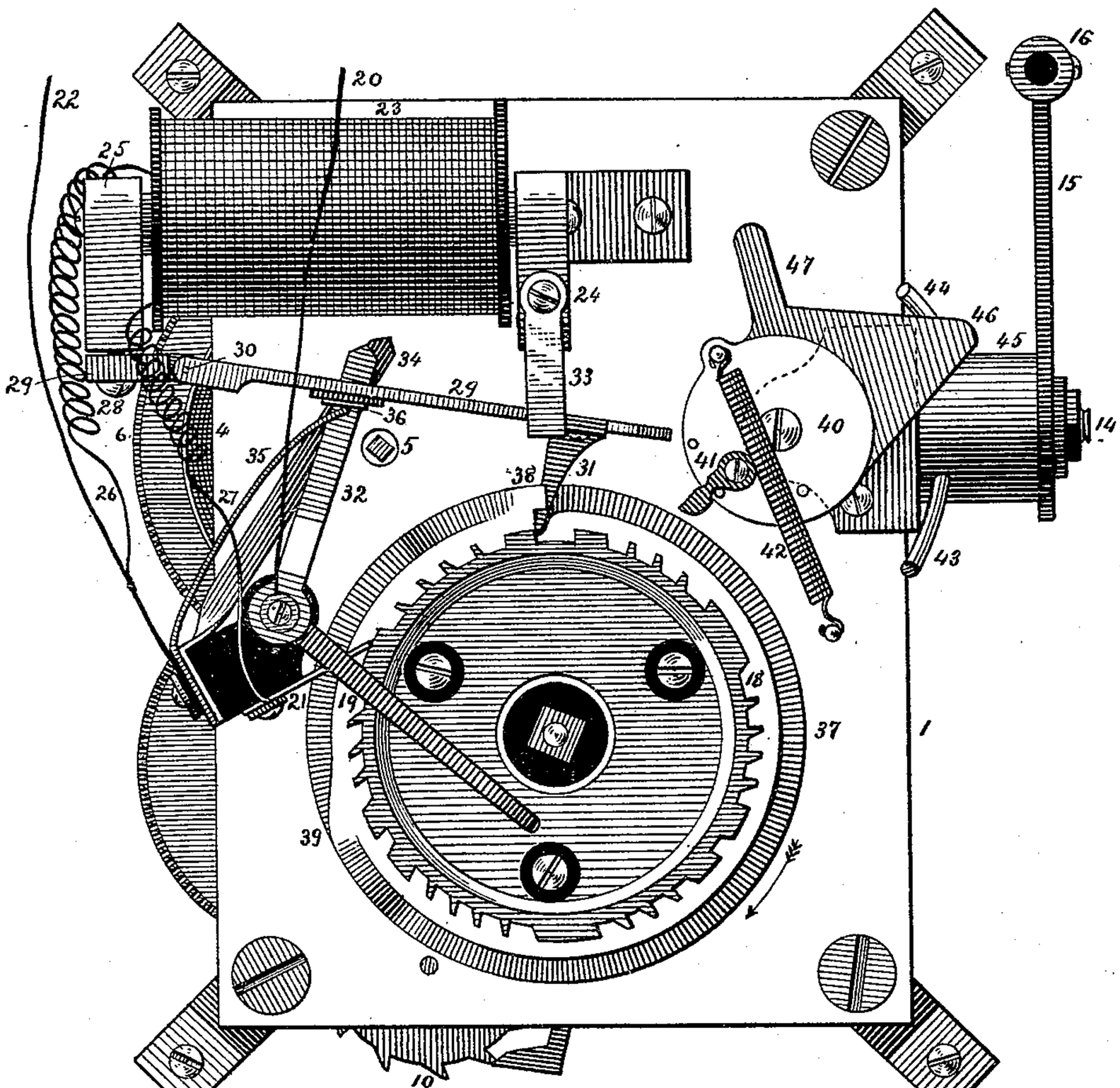

Fig. 1.

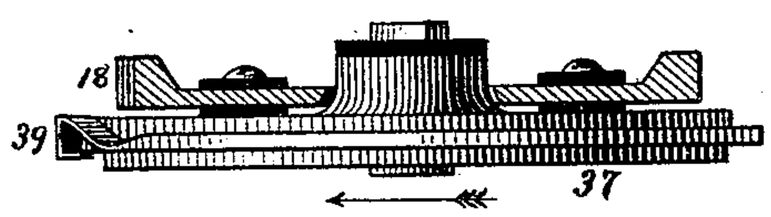

Fig. 2.

Witnesses
Lyon C. Peterson
C. E. Humphrey.

Inventor
Frank F. Loomis
By His
Attorney
C. E. Humphrey.

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F. F. LOOMIS.

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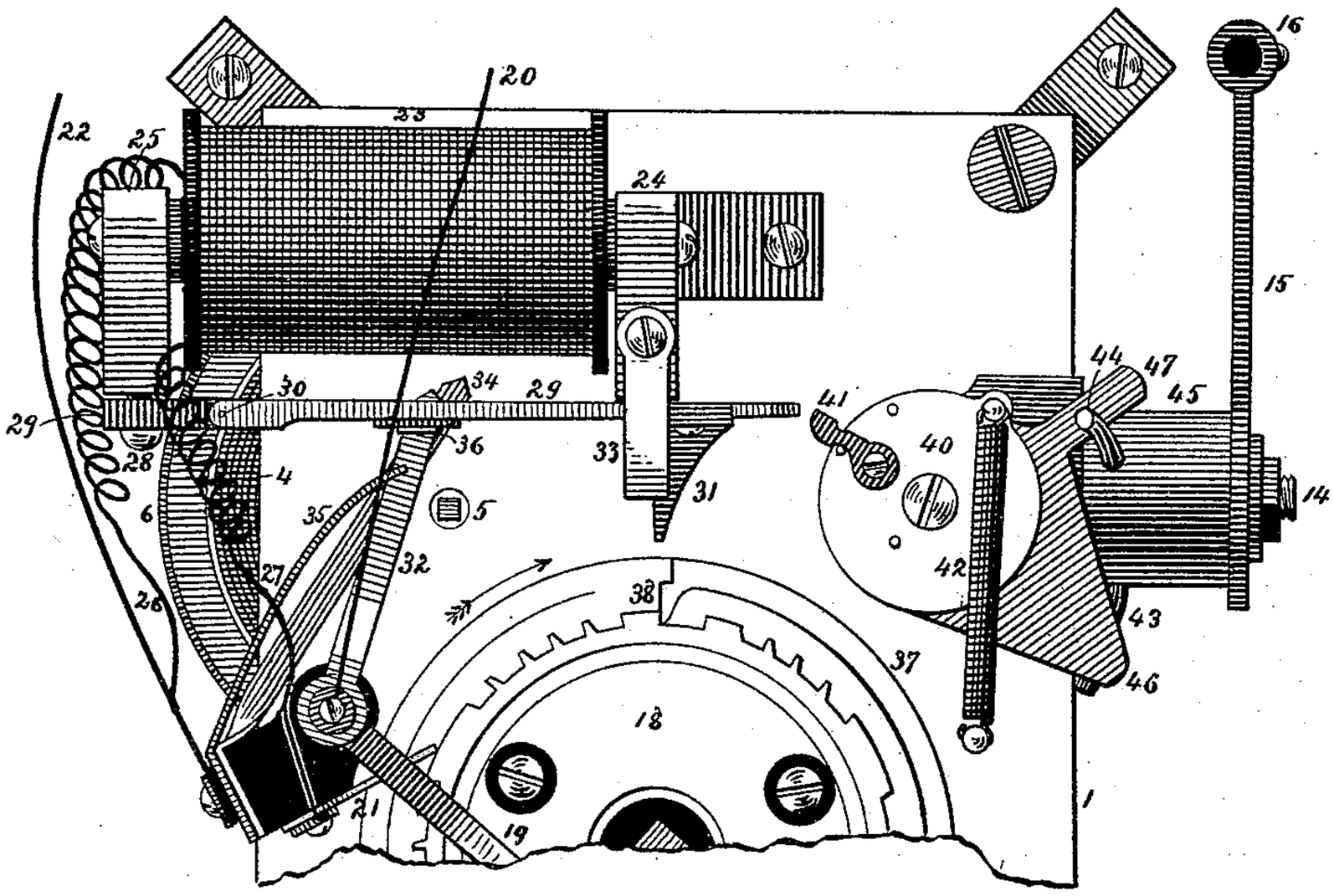

Fig. 3.

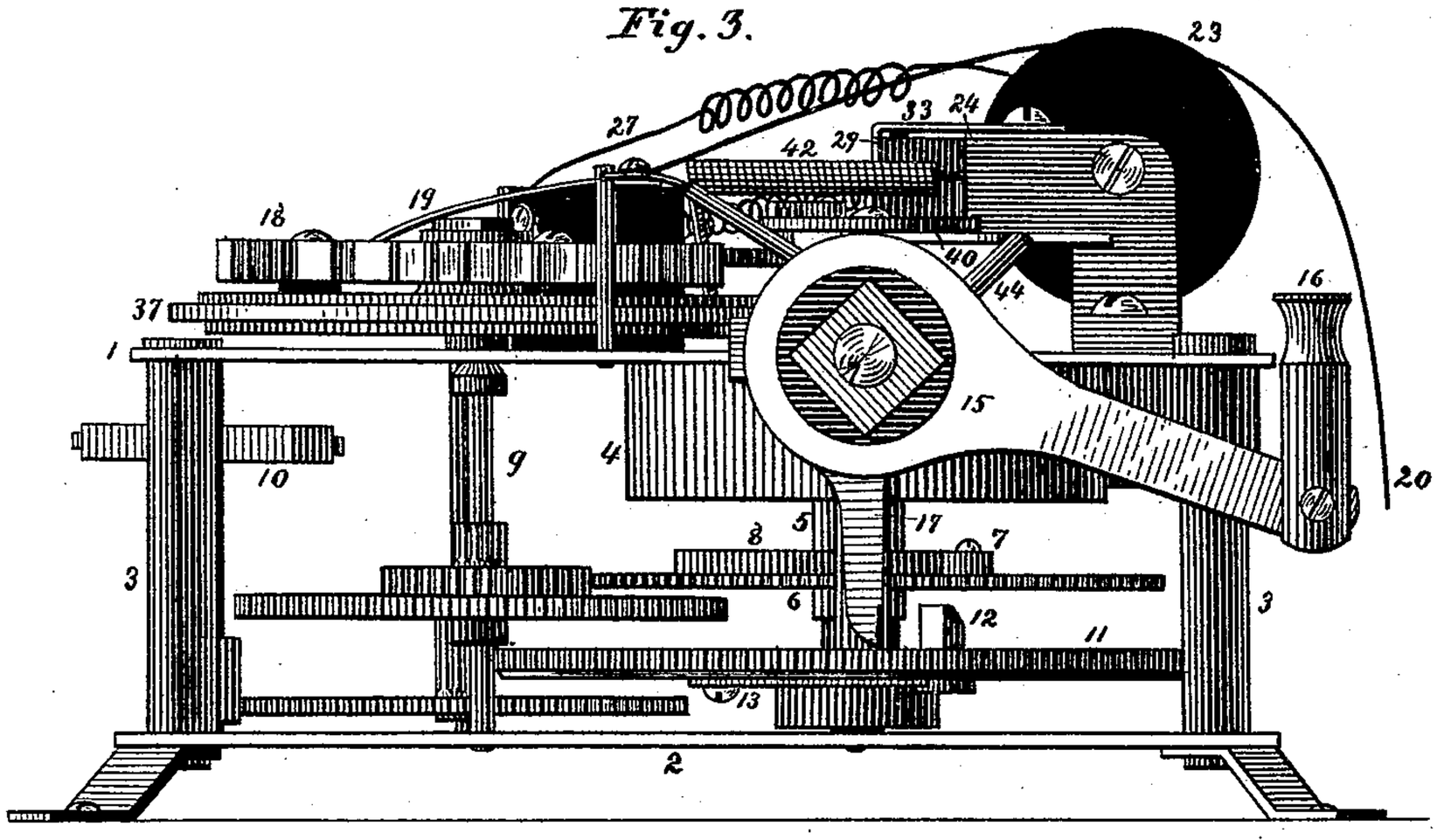

Fig. 4.

Witnesses
Tron Peterson
C. E. Humphrey.

Inventor
Frank F. Loomis
by his
Attorney
C. P. Humphrey.

(No Model.) 3 Sheets—Sheet 3.

F. F. LOOMIS.

NON INTERFERING FIRE ALARM BOX.

No. 461,169. Patented Oct. 13, 1891.

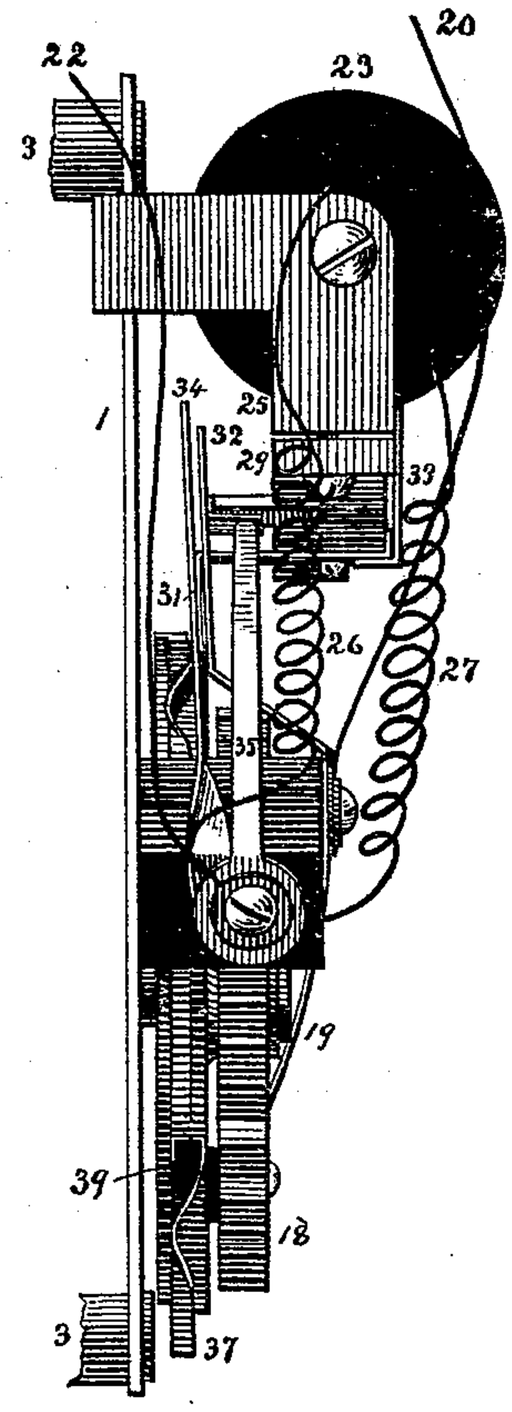

Fig. 5.

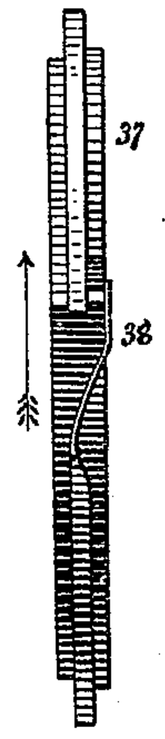

Fig. 7.

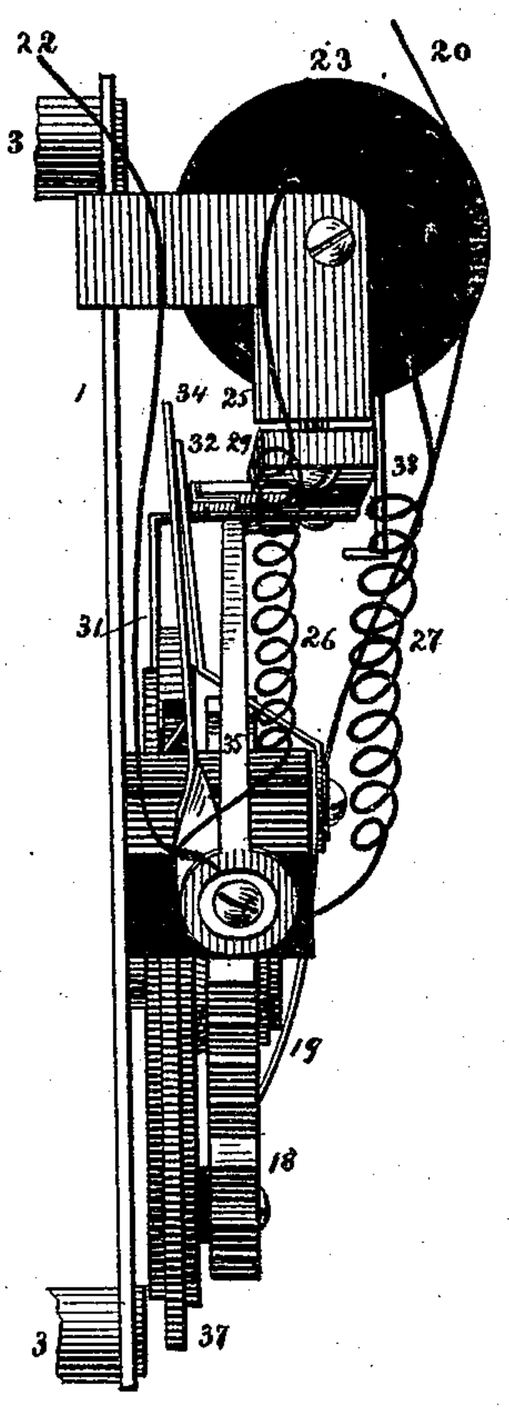

Fig. 6.

Witnesses
Wm. C. Peterson
C. E. Humphrey.

By Attorney
C. R. Humphrey

Inventor
Frank F. Loomis

UNITED STATES PATENT OFFICE.

FRANK. F. LOOMIS, OF AKRON, OHIO.

NON-INTERFERING FIRE-ALARM BOX.

SPECIFICATION forming part of Letters Patent No. 461,169, dated October 13, 1891.

Application filed May 1, 1891. Serial No. 391,304. (No model.)

To all whom it may concern:

Be it known that I, FRANK. F. LOOMIS, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Non-Interfering Fire-Alarm Boxes, of which the following is a specification.

The object of my invention is to produce an improved box for fire-alarm and other telegraph systems in which a number of signal-boxes, each arranged to communicate a determined signal, are arranged in a continuous circuit, which shall transmit no signal when another box of the system is in operation, and in which the coil which brings it into action shall be cut out when the box is closed to reduce the resistance to the current of the system.

My invention consists in the peculiar and novel mechanism, construction, and combination of parts, hereinafter described, and then specifically pointed out in the claims, reference being had to the accompanying drawings, which constitute a part of this specification.

In the accompanying drawings, in which similar reference-numerals indicate like parts in the different figures, Figure 1 is a front elevation of the box mechanism, showing the position of the parts when the box is closed; Fig. 2, an inverted plan of the shunt-wheel detached, with the signal-wheel in section, looking from the bottom of Fig. 1; Fig. 3, a front elevation of the box mechanism, showing the position of the parts at the moment the box is opened; Fig. 4, a side elevation of the box mechanism lying down, looking from the right of Fig. 1, the parts being in the same position shown in that figure; Fig. 5, a side elevation of the mechanism on the front of the train-frame, looking from the left of Fig. 1, the parts being in the position shown in that figure; Fig. 6, a similar view showing the position of certain parts when the box is open, but cut out from interference, as hereinafter described; and Fig. 7 a plan of the shunt-wheel detached, looking from the top of Fig. 1.

Arrows adjacent to the shunt-wheel in the different figures indicate the direction of its motion.

The motor for operating the signaling mechanism consists of a train of clock-work mounted in a frame consisting of front and back plates 1 2, supported by corner posts 3, and is driven by a coiled spring 4, attached to a shaft 5. On the shaft 5 is loosely mounted a gear-wheel 6, and is driven in one direction by the spring 4 as it unwinds by a pawl 7, pivoted to it, engaging a ratchet-wheel 8, attached to the shaft 5. The gear-wheel 6 drives, through a train of gearing, the members of which it has not been deemed necessary to more particularly describe, a shaft 9, which carries the signaling-wheel hereinafter described, and the motion of the train is regulated by an escapement 10. The spring 4 is partially wound up, sufficiently to give the determined signal at each opening of the box by the following-described mechanism: Mounted on a shaft journaled in the frame is a large gear-wheel 11, which meshes in a pinion on the shaft 5 and bears at one side a sliding bolt 12, having one beveled and one flat face, and is constantly pressed to project beyond the face of the wheel 11 by a spring 13, attached to the opposite face of the wheel. On a post 14, projecting from the edge of the front plate 1, is journaled a rocking lever 15, on whose outer end is pivoted an arm 16, arranged to be connected with a rod extending from the inside of the box-door, and from one side of which lever extends a toe 17, arranged to engage the flat face of the bolt 12 as the lever 15 is rocked forward and cause a partial revolution of the wheel 11 and a consequent winding of the spring, and on the return movement to engage the beveled face of the bolt and force it back and resume its former position. This mechanism is so arranged that after the signal has been given the bolt 12 will be in position to be engaged by the toe 17 as the door of the box is opened. Frictionally mounted on the shaft 9, in front of the plate 1, is the insulated metallic signal-wheel 18, arranged ordinarily to be driven by and turned with said shaft, but sufficiently free to be turned thereon for adjustment, and has on its edge series of teeth for the determined signal, alternating with longer blocks, for a purpose to be stated. An insulated spring 19, connected with one end 20 of the line wire, constantly presses on the front of the wheel 18, and a second insulated spring 21 engages the points of the teeth and faces

of the blocks as the wheel revolves, and when thus in contact closes the circuit when electrically connected with the other end 22 of the line-wire, as hereinafter described.

As thus far described the mechanism, except in minor matters of form and details of construction, does not essentially differ from the signal-box for which I was granted Letters Patent of the United States No. 323,435 on the 4th day of August, 1885.

The mechanism for placing the signaling mechanism in circuit and rendering the box non-interfering consists of the following devices: Attached to the front plate 1 is an electro-magnet 23, its poles terminating in blocks 24 25 and the ends of its coil connected by a branch wire 26 with the end 22 of the line-wire and its other end with the spring 21 by the wire 27. Pivotally connected to the block 25 by a screw 28 and free to rock horizontally thereon is an armature 29, consisting of two bars hinged together at the point 30, so that the free end can rock vertically, and near the extremity of the free end is an offset depending finger 31, for a purpose to be stated. A spring 32, electrically connected with the spring 19, constantly presses against a contact-plate 36 on the back of and extending under the armature and serves the twofold purpose of constituting a part of the circuit connection, as hereinafter described, and also rocking the armature horizontally forward, and a stop 38, attached to the block 24, arrests the forward movement of the free end of the armature at a determined point. Electrically connected with the wire 22 are two springs 34 35, the upper end of the former being opposite the upper end of the spring 32 and arranged to be in contact with it when the armature is rocked horizontally backward and separate from it when the armature rocks forward. The other spring 35 is arranged to press against the contact-plate 36 on the under side of the armature when the latter rocks downward and out of contact when the armature is raised. Mounted on the shaft 9 between the plate 1 and alarm-wheel 18, and attached to and revolving with, but electrically insulated from, the latter, is the shunt-wheel 37, consisting of a narrow pulley having two flat peripheral faces, the front one of greater diameter than the other, divided by a central annular flange, and the finger 31 is arranged to rest and travel on one or the other of these faces, as hereinafter described. At the point 38 the flange is broken, and one end is reduced in width and turned diagonally in the direction of the motion of the wheel to the outer edge of the front face and slightly past the opposite end of the flange, between which overlapping ends and slightly past said opposite end is a deep notch in the front face for the finger 31 to enter and stop the mechanism. (See Figs. 1, 3, and 7.) At the point 39 the front face inclines upward in a direction opposite to the motion of the wheel until it is even with the flange, beyond which both are abruptly cut away, forming a recess, while the flange from a short distance in the opposite direction is reduced by being incurved on the front, and thence, in reduced thickness, turns diagonally outward to the outer edge of the inclined front face. (See Figs. 1, 2, and 5.)

On the front of the plate 1, opposite the end of the armature, is journaled a disk-wheel 40, bearing a pivoted pawl 41, arranged to engage and raise the free end of the armature within the field of the magnet 23 as the disk-wheel is partially revolved; and a spring 42 serves to complete the partial revolution of said wheel in either direction after it shall have passed its center, so that the pawl shall not interfere with the movement of the armature. This disk-wheel is rocked as the box-door is opened and closed by two pins 43 44, projecting from a hub 45, mounted on the shaft 14 and turning with the lever 15, which pins alternately engage a projection 46, extending from the disk-wheel, and a second projection 47 limits the movement of the disk-wheel when the door is opened by encountering the pin 44. When the box is closed and ready for operation, as shown in Figs. 1 and 5, the finger 31 rests in the notch at the point 38 and the springs 27 and 32 rest against the contact-plate 36, thereby establishing a short circuit between the ends 20 and 22 of the line-wire through said springs and contact-plate.

At the moment the door is opened, as shown in Fig. 3, the free end of the armature is raised by the pawl 41 from the notch at the point 38, thereby releasing the mechanism, and brought within the field of the magnet 23 and the contact between the spring 35 and contact-plate 36 broken. The current is thus established from the line-wire 20 through the spring 19, wheel 18, spring 21, wire 27, magnet-coil 23, and wire 26 to the line-wire 22, thereby energizing the magnet which retains the armature suspended as long as the spring 21 is in contact with one of the blocks on the periphery of the wheel 18. The relative arrangement of the parts is such that the spring 21 will always bear on one of these blocks when the finger 31 is in the notch of the wheel at the point 38. The mechanism being released, the wheel 37 immediately commences to revolve until the block of the wheel 18 passes the spring 21, when, the current being broken, the armature falls and the finger 31 rests on the front face of the wheel 37, the interval of its suspension due to the length of the block on the wheel 18 being sufficient to permit the diagonal part of the flange at the point 38 to pass beyond it. The determined signal is then successively transmitted until the wheel 37 has completed one revolution and the finger 31 falls into the notch at the point 38. When the inclined part of the wheel 37 at the point 39 reaches the finger 31, the latter is thereby raised sufficiently to again bring the armature within the field of the magnet, where it

is held for a short interval until the diagonal part of the flange at that point passes beyond it, the relative arrangement of the blocks on the periphery of the wheel 18 being the same with regard to it as with reference to the notch at the point 38, as hereinbefore described, where it again falls on the front face of the wheel and the signals are continued.

If another box is in operation when this box is opened, the circuit is thereby broken by its signaling mechanism, and the armature not being held up by the magnet 23 the finger 31 falls back of the diagonal part of the flange at the point 38, and the armature is thereby rocked backward, so that the finger travels on the back face of the wheel and the springs 32 34 are brought in contact, thus establishing a short circuit through them and cutting the signaling mechanism out of circuit. The back face of the wheel at the point 38, opposite the notch in the front face, is inclined upward until even with the top of the flange, (see Fig. 7 and dotted line in Fig. 3,) which when reached by the finger 31, traveling on the back face, raises the armature within the field of the magnet, when if the line is still interrupted it falls back of the inclined flange and is again forced by it on the back face, but if the line is closed it is held up by the magnet until the diagonal part of the flange is passed, as hereinbefore described, when by force of the spring 32 it falls on the front face and the signal is transmitted.

If at the moment of opening the door some other box is in operation, and its spring similar to the spring 21 rests on one of the blocks of its wheel sufficiently long to permit the finger 31 to fall in front of the flange—a coincidence extremely unlikely to occur—this box would communicate its signals until the finger 31 ascended the inclined face at the point 39, when, the circuit being continually broken by the signaling mechanism of the other box, it would fall back of the diagonal part of the flange, and the box would be cut out of the circuit in the same manner as hereinbefore described with reference to the operation at the point 38. It may be found expedient to have a succession of these shunts about the wheel 37 to guard against any possible contingency.

I claim as my invention—

1. In a signal-box, a signal-transmitter and a motor for driving it, and a non-interfering magnet, and a horizontally-rocking armature arranged when rocked in one direction to close the circuit through the signaling mechanism and when rocked in the opposite direction to close a short circuit and cut said signaling mechanism out of circuit, combined with a shunt-wheel arranged to revolve with the mechanism and rock said armature from one direction to the other, substantially as shown and described.

2. In a signal-box, a signal-transmitter and a motor for driving it, and a non-interfering magnet, and a horizontally-rocking armature provided with a finger and arranged to close the circuit through the signaling mechanism when rocked in one direction and to close a short circuit and cut said signaling mechanism out of circuit when rocked in the opposite direction, combined with a shunt-wheel having two peripheral faces arranged to be respectively traveled by said armature-finger when the armature is rocked in alternate directions and provided with a diagonal way to shift said finger from one face to the other, substantially as shown and described.

3. In a signal-box, signaling mechanism consisting of a signal-wheel provided with elongated peripheral blocks alternating with signaling-points, and a contact-spring arranged to engage and make electrical connection with said blocks and points, in combination with a non-interfering magnet, and a horizontally and vertically rocking armature provided with a finger arranged when raised and rocked in one direction to close the circuit through the signaling mechanism and magnet and when lowered and rocked in the opposite direction to close a short circuit and cut said magnet and signaling mechanism out of circuit, and a shunt-wheel having two peripheral faces traveled, respectively, by said armature-finger when rocked in alternate directions and provided with a diagonal way to shift said finger from one face to the other, the blocks of said signal-wheel arranged to be in contact with the contact-spring when the finger is opposite said diagonal way to cause said magnet to hold said armature suspended until said way passes said finger, substantially as shown and described.

4. In a signal-box, a signal-transmitter and a motor for driving it, and a non-interfering magnet, and a vertically-rocking armature provided with a detent-finger to engage and arrest the signaling mechanism when the box is closed, arranged when lowered to be without the field of said magnet and to close a short circuit and cut said signaling mechanism and magnet out of circuit and when raised to be within the field of said magnet and close the circuit through said magnet and signaling mechanism, combined with a pawl arranged to be operated by opening the box and engage and raise said armature, substantially as shown and described.

5. In a signal-box, a signal-transmitter and a motor for driving it, and a non-interfering magnet, and a horizontally-rocking armature arranged to close the circuit through the signal-transmitter and magnet when rocked in one direction and to close a short circuit and cut said signal-transmitter out of circuit when rocked in the opposite direction, combined with a spring to constantly force said armature in the direction to close the circuit and a shunt-wheel actuated by the motor to rock the armature in the opposite direction when the main circuit is interrupted, substantially as shown and described.

6. In a signal-box, a signal-transmitter and a motor for driving it, and a vertically and horizontally rocking armature provided with a detent-finger, and a spring to constantly force said armature in one direction, combined with a shunt-wheel arranged to revolve with the signal mechanism, having two faces for the detent-finger to travel on divided by a flange, the face in the direction of the force of the spring having a notch for the detent-finger to enter and arrest the mechanism, and the outer face opposite said notch being inclined to the top of the flange to raise the detent-finger above said flange and within the field of the magnet at each revolution of the wheel, said armature being arranged to close a short circuit and cut said signal-transmitter out of circuit when the detent rests in the notch, to close the circuit through the signal-transmitter when it rests on the notched face, and to close a second short circuit and cut the signal-transmitter out of circuit when it rests on the other face, substantially as shown and described.

7. The combination, with the vertically-rocking armature and the disk-wheel carrying the pawl to engage and raise the armature, of the spring to complete the partial revolution of the disk-wheel when it shall have reached its center, substantially as shown and described.

8. The combination, with the rocking armature and the disk-wheel bearing a pawl to engage and raise the armature and having a projecting toe, of a hub arranged to be rocked by opening and closing the box-door and provided with pins to engage the toe of and partially rotate said disk-wheel, substantially as shown and described.

9. The combination, with the signal-transmitter and its motor, and the non-interfering magnet, and a vertically and horizontally rocking armature provided with a detent-finger and contact-plate, of the shunt-wheel having a detent-notch and parallel faces with diagonal crossways, and the spring 32, connected with one end of the line-wire, and the springs 34 35, connected with the other end of said line-wire, all constructed and arranged substantially as shown and described.

In testimony that I claim the above I hereunto set my hand.

FRANK. F. LOOMIS.

In presence of—
C. P. HUMPHREY,
C. E. HUMPHREY.