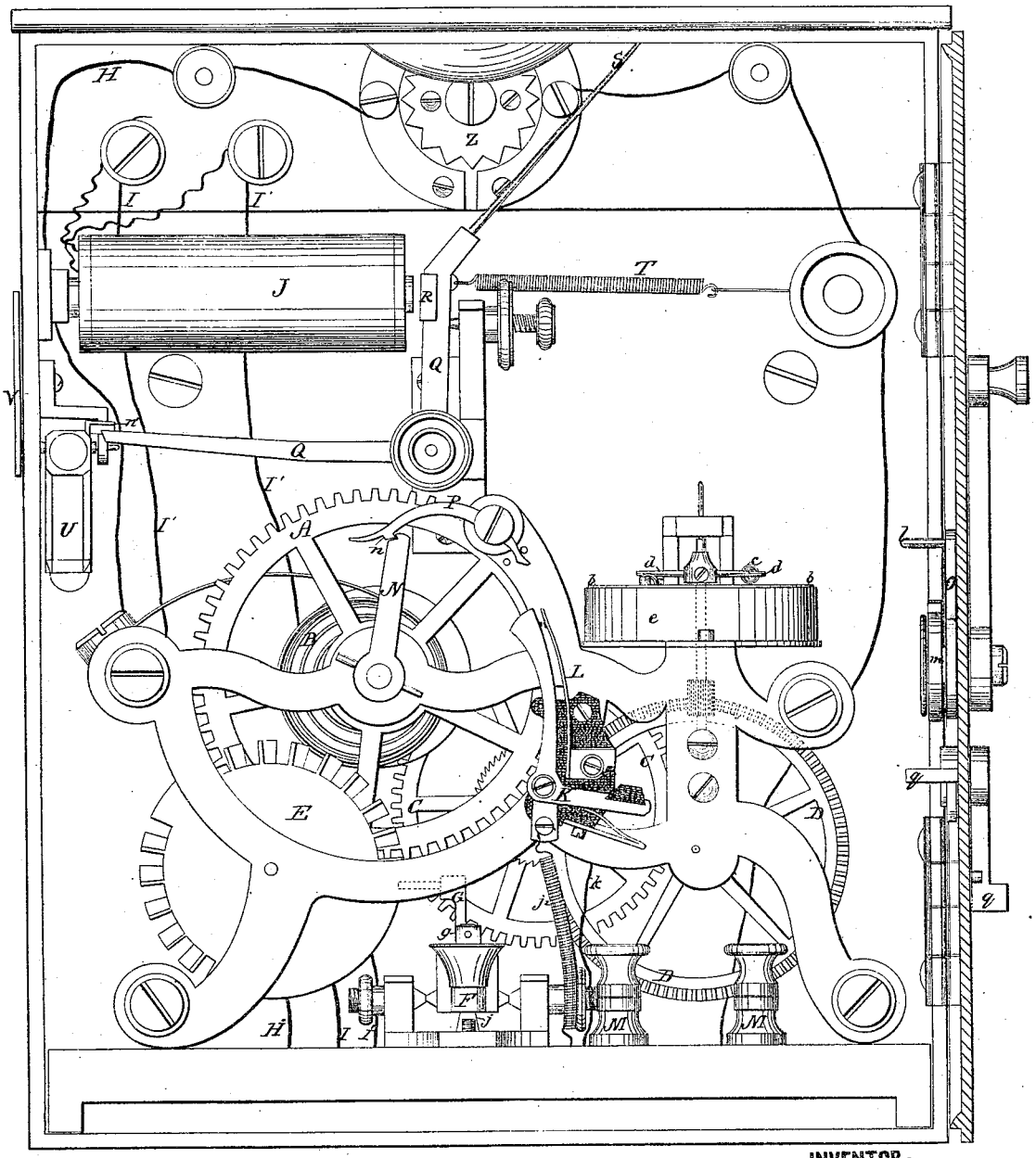
3 Sheets--Sheet 1.

W. E. FACER.

Fire-Alarm Signal-Box.

No. 164,537. Patented June 15, 1875.

Fig. 1.



WITNESSES:

W. W. Hollingsworth.

Solon C. Kemon

INVENTOR:

W. E. Facer

BY Munn & Co

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N. Y.

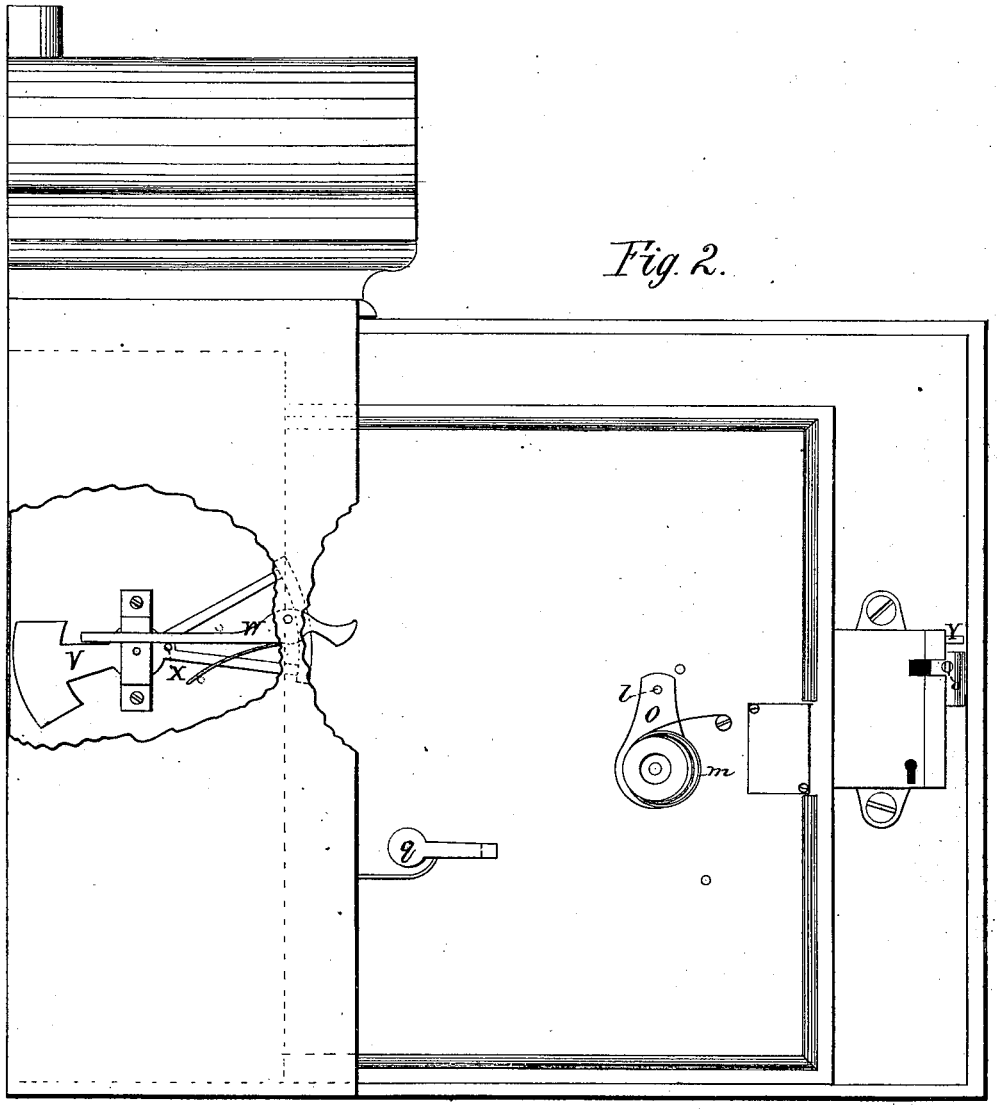
3 Sheets--Sheet 2.

W. E. FACER.

Fire-Alarm Signal-Box.

No. 164,537. Patented June 15, 1875.

Fig. 2.



WITNESSES:

W. W. Hollingsworth

Solon Kenon

INVENTOR:

W. E. Facer

BY Kenon & Co

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

3 Sheets--Sheet 3.

W. E. FACER.

Fire-Alarm Signal-Box.

No. 164,537. Patented June 15, 1875.

Fig 3.

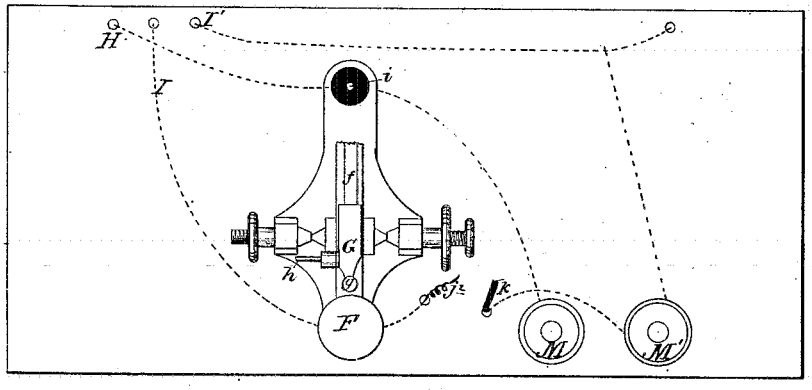


Fig 4.

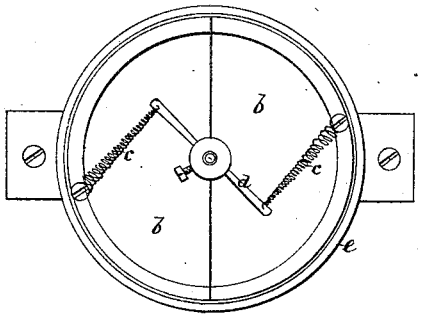


Fig 5

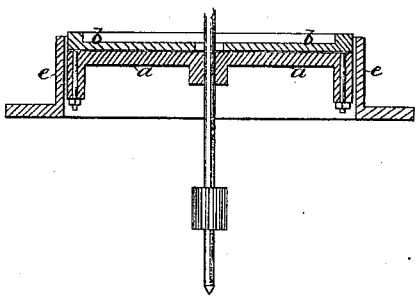
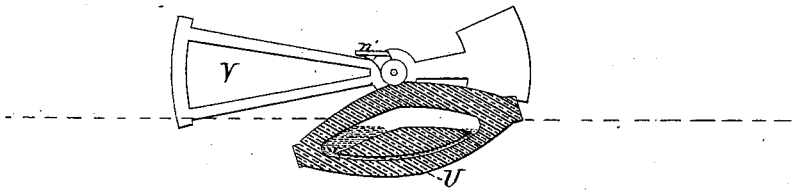


Fig. 6.



WITNESSES:

W. W. Hollingsworth

Solon C. Kemon

INVENTOR:

W. E. Facer

BY Munn & Co

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

WILSON E. FACER, OF TORONTO, CANADA.

IMPROVEMENT IN FIRE-ALARM SIGNAL-BOXES.

Specification forming part of Letters Patent No. **164,537**, dated June 15, 1875; application filed April 26, 1875.

To all whom it may concern:

Be it known that I, WILSON E. FACER, of Toronto, in the Province of Ontario, Dominion of Canada, have invented a new and Improved Electric Fire-Alarm; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a front elevation of the instrument, with the door open and in section; Fig. 2, a vertical side elevation, with the doors open and portions of the box broken away; Fig. 3, a plan view of the base of the instrument, with the operating parts removed, showing the circuits; Fig. 4, a plan of the governor; Fig. 5, a vertical section of the same; Fig. 6, a sectional view of the mercury-balance.

The invention relates to certain new and useful improvements in electric fire-alarms; and it consists, first, in a notched disk, having its notches arranged diagonally to form cams, and operated by a clock-gearing, in combination with an habitually-closed key, provided with a pivoted spring-seated lever carrying a stud, whereby the circuit is kept closed when the toothed wheel is wound up, and the circuit alternately opened and closed when the wheel moves in the opposite direction to send the signals; second, in the combination, with two contact-points, of a crank upon the main shaft, whereby the current is shunted from the bell-magnets when the apparatus is wound up, so as to allow the armature of the magnets to hold the hammer back ready for the first stroke upon the magnetizing of the magnets again; third, in the combination, with the clock mechanism, of a friction-governor, consisting of pivoted segments held and adjusted by springs, which segments create a friction with the incasing frames by centrifugal force, and regulate the intervals between the strokes of the bell; fourth, in the combination, with the setting-crank, carrying a spring and a pin that engages the crank of the main shaft, of a pivoted hook, which acts as a stop for the said main-shaft crank, and a lock for the setting-crank, which latter is brought back by its spring into such a position that the said setting-crank cannot stop or interfere with the operation of the instrument, after once in motion, until the actuating mechanism is spent; fifth, in the combination of a pivoted locking-segment with the armature of the electro-magnet, by means of which the demagnetizing of the magnets moves the segment in front of a catch upon the door of the instrument, so that when the main current is broken by an instrument all of the doors of the other boxes are locked, and all confusion and interference of signals is avoided; sixth, in the combination of the non-interference locking-segment and a spring-seated lever attached to the outer casing, and operated by a stud upon the outer door, whereby the box can be shut up while the device is working without breaking or interfering with the locking-segment.

In the drawing, a wheel, A, carrying a spring, B, forms the actuating mechanism, whose motion is regulated through the wheel C, carrying the ratchet and the crown-wheel D, by a centrifugal friction-governor. This said governor consists of a horizontal disk, *a*, attached to a vertically-revolving shaft, and segments *b*, pivoted to the said disk and held together by springs *c*, which are regulated by the adjusting-bar *d*, attached to the vertically-revolving shaft by a collar and a set-screw. The said disk and its segments are disposed inside a circular frame, *e*, so that when the disk is revolved, centrifugal force sends the segments against the sides of the inclosing frame with a frictional contact, and forms an automatic governor, which may be adjusted for the intervals between the strokes of the bell by moving the bar *d*. E is a notched disk, which is driven, through a pinion upon the same shaft, by the main wheel A. Said notched disk has its notches to correspond in number and arrangement to the number of the box, and are arranged diagonally to form cams. This said disk sends the signals by causing the notches to operate a key or transmitting-lever, F, the current passing only through the wires and the key, and never through the notched disk or other parts of the frame or operating mechanism. G is an elbow-lever, pivoted to the key F upon horizontal pivots, and provided with a spring, *f*, and an adjusting set-screw, *g*. The vertical arm of this lever carries a pin, *h*, which, when the notched disk is wound up, moves upon one side of the

diagonal cam-faced notches by reason of its pivot and spring *f*, the said elbow-lever moving independently of the transmitting-key. When the retrograde motion of the notched wheel commences to send the signals, however, the pin *h* engages the opposite side of the diagonal notches, and the elbow-lever and the whole transmitting-key is moved to one side, breaking the connection between the said transmitting-key and its insulated contact-point *i*. When the notches have passed the pin *h*, the spring *j* of the transmitting-key brings it to its former position, and closes the circuit again with the contact-point *i;* and thus the circuit is made and broken a given number of times, and the signals announced upon the bell at the central station, and also upon the bell in the instrument. H is the wire of the positive pole of the main line, which connects with the insulated contact-point *i*. I I′ are the wires leading to the bell-magnet J, of which wire I is connected with the transmitting-key, and I′ with the negative pole H′ of the main line. K is an insulated spring-seated elbow-lever, connected by wire *j*² with the transmitting-key, and L is an insulated spring-contact, connected by wire *k* with the negative line-wire H′. The said lever and contact form a switch, which, when they are brought in contact, shunt the circuit from the bell-magnets. M M′ are two test-electrodes, which connect with the two ends of the line-wire, for the purpose of affording a ready means to the inspector for testing the operative condition of the instrument. N is a crank attached to the main shaft of wheel A, against which a stud, *l*, of the setting-crank O engages to wind up the spring. P is a pivoted stop for the crank N, which prevents the mechanism from running down too far, and always stops the notched disk in the same position. The said stop P falls of its own weight after the crank N has been deflected, and the setting-crank O, being provided with a spring, *m*, brings back its stud *l* behind a shoulder, *n*, of the stop P, and locks the setting-lever, so that it cannot be moved again until the instrument is run down.

In connection with the apparatus as thus described, the non-interfering devices are constructed and arranged as follows: Q is an elbow-lever, pivoted at its angle, and having upon its vertical extension an armature, R, that plays upon the magnets J, and a hammer, S, that strikes the bell above, the armature being held apart from the magnets by a spiral spring, T. The horizontal end of the elbow-lever rests beneath a catch, *n′*, upon a mercury-balance, U, which is attached to the same shaft with a segment, V. The said mercury-balance consists of a lever formed by an angular chamber containing mercury, which is capable of being transferred in bulk from one side to the other of the fulcrum, but is returnable to the other side through a small gate, so as to allow it to slowly recover its former position. The segment and balance are so pivoted as to be heaviest at the front end, by reason of which, when the magnets are charged, and the horizontal arm of the lever is down, the segment is down and out of the way of a stud, *o*, upon the bolt of the outside lock, and the door can be opened to give an alarm. When the magnets are demagnetized by the breaking of the circuit during the operation of a box, the horizontal arm of the elbow-lever is up, and the balance elevated and in front of the stud *o* upon the bolts of the doors of all the instruments, and none of them can be opened until the box which is operating is through, and the magnets of all the instruments recharged, and the segments moved out of the way of the stud upon the bolts of the doors.

When the circuit is being made and broken by the operating-instrument, the segments of all the instruments will have a slight vibratory motion, which will not affect the security of the locking devices, by reason of the fact that the segment is constructed wide enough to allow for the said vibration, and the return-gate for the mercury is too small to allow the mercury to be transferred to the opposite side of its pivot in the small time between the intervals of the strokes.

To the inner side of the outer box is pivoted a spring-seated lever-catch, W, which, when the door is closed, operates with a stud, X, upon the segment, and a stud, Y, upon the door to push the segment out of the way of the stud *o*, so as to admit of the closing of the door after sending the alarm while the instrument is in operation. Z is a lightning-arrester, having a contingent communication with the line-wire and the ground. To the inside part of the outside door is attached an insulated cam, which, when the door is closed, deflects an elbow-lever, *q*, pivoted in the inner door, and the said elbow-lever, moving the insulated lever K, produces a contact between the same and the spring L, and shunts the circuit from the bell-magnets. The said switch, however, is only to be used in the absence of the interfering devices, as both operated together would lock all of the boxes, so as to render it impossible to open the doors of any of them.

The operation of the instrument is as follows: The current, coming in at wire H, takes the following course: contact-point *i*, transmitting-key, wire I to the magnets, and I′ out to H′, the magnets being charged and the segments down, so that the boxes can be opened. When an alarm is to be sent, the setting-lever is deflected its entire limit, (about two hundred degrees,) which gives four revolutions of the disk and three repetitions of the first signal. As soon as the main-shaft crank is deflected the distance for one set of signals, it closes the circuit between lever K and spring L, and, shunting for an instant the circuit from the magnets, allows the spring of the armature to draw back the hammer. If the crank be allowed to pass the lever K slowly, the bell will strike by reason of the recharging of

the magnets, and if the setting-crank is let go the instrument will send in one signal. If the setting-crank is deflected rapidly its entire distance the magnets are not demagnetized by the momentary contact, and the circuit is not broken until the instrument commences to operate. As soon as the setting-crank is released the notched disk commences to revolve, and, by engaging with the pin upon the elbow-lever of the transmitting lever or key, operates the latter to send the signals indicating the locality of the box. While one instrument is operating, the segments of all the other boxes are in front of the stud upon their respective locks, and, as they cannot be opened, the device renders them non-interfering.

Having thus described my invention, what I claim as new is—

1. The disk E, having its notches arranged diagonally, so as to form cams, in combination with the transmitting-key F and the elbow-lever G, having a pin, *h*, substantially as and for the purpose described.

2. The combination, with the insulated lever K and spring L, having contact-points, of the crank N, substantially as and for the purpose described.

3. The combination, with the notched disk E, the main driving-spring, and the intervening train of gear-wheels, of the friction-governor, consisting of a disk, *a*, having pivoted segments *b*, springs *c*, and an adjusting-bar, *d*, all contained within the frame *e*, substantially as and for the purpose described.

4. The combination, with the crank N and the setting-crank O, carrying a spring and a stud, *l*, of a pivoted double stop, P, substantially as and for the purpose described.

5. The combination of the pivoted locking-segment V and the mercury-balance U with the armature of the magnets, and the stud *o* upon the door-bolt, as and for the purpose described.

6. The combination of the locking-segment V, carrying stud X, with the spring-seated lever-catch W upon the inside of the outer case, and the stud Y upon its door, substantially as and for the purpose described.

The above specification of my invention signed by me this 21st day of April, 1875.

W. E. FACER.

Witnesses:

SOLON C. KEMON,

CHAS. A. PETTIT.