(No Model.) 2 Sheets—Sheet 1.

W. E. DECROW.

ELECTRIC SIGNALING APPARATUS.

No. 413,436. Patented Oct. 22, 1889.

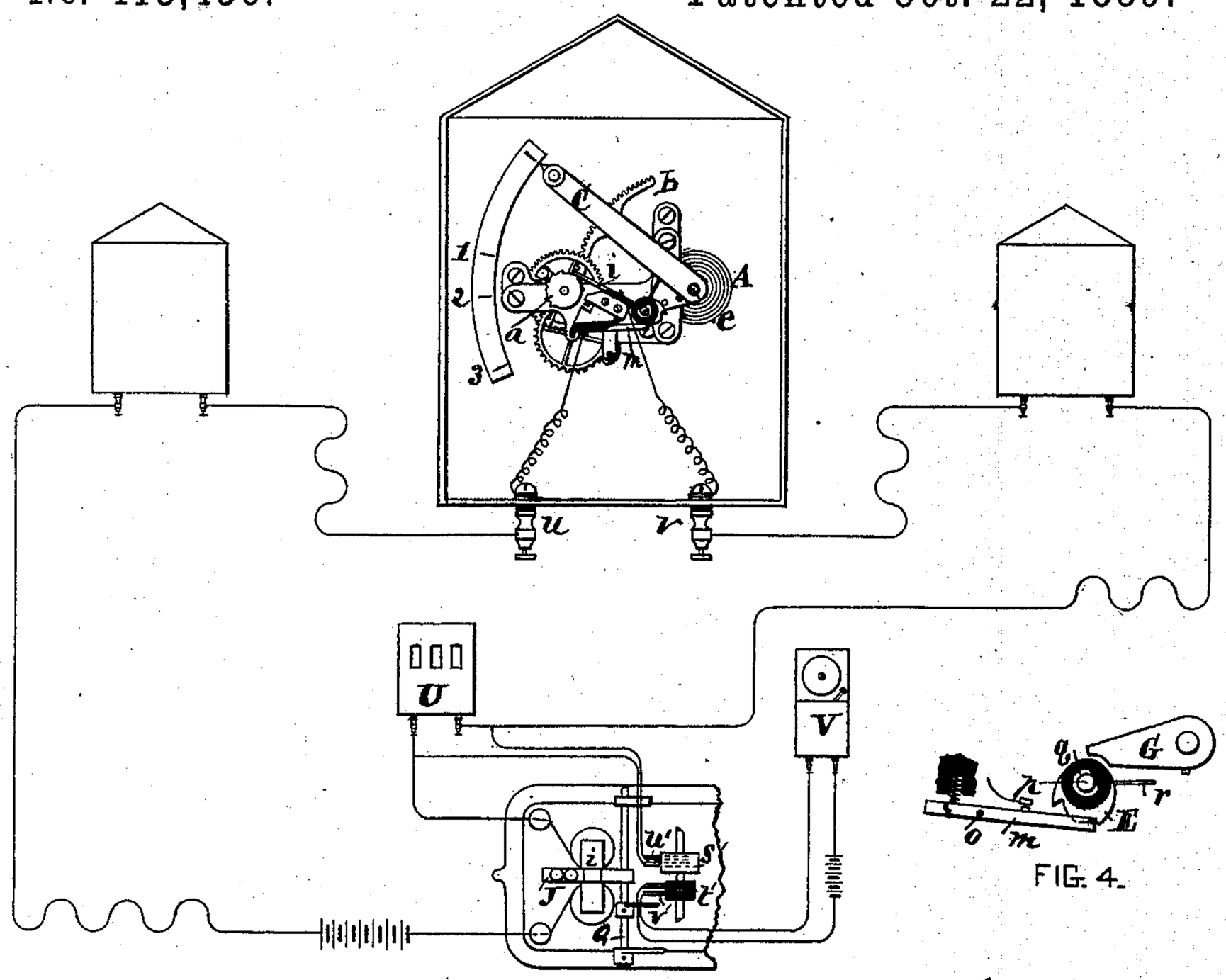


FIG. 1.

FIG. 4.

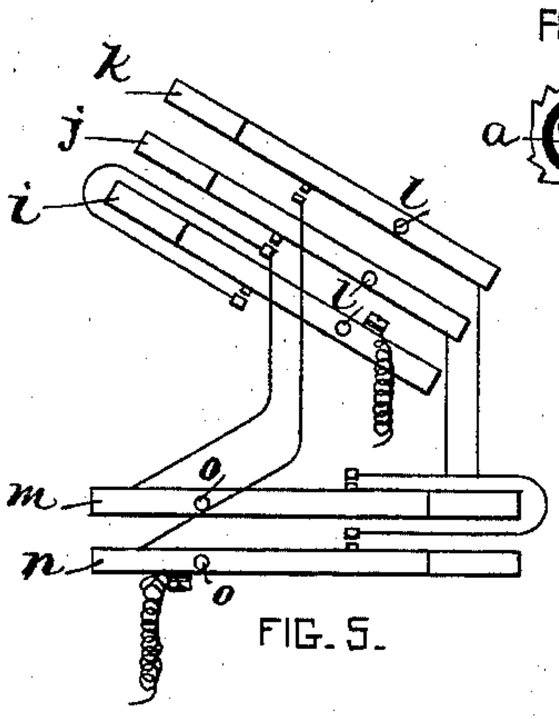
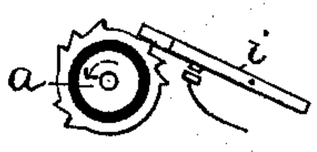


FIG. 5.

FIG. 10.



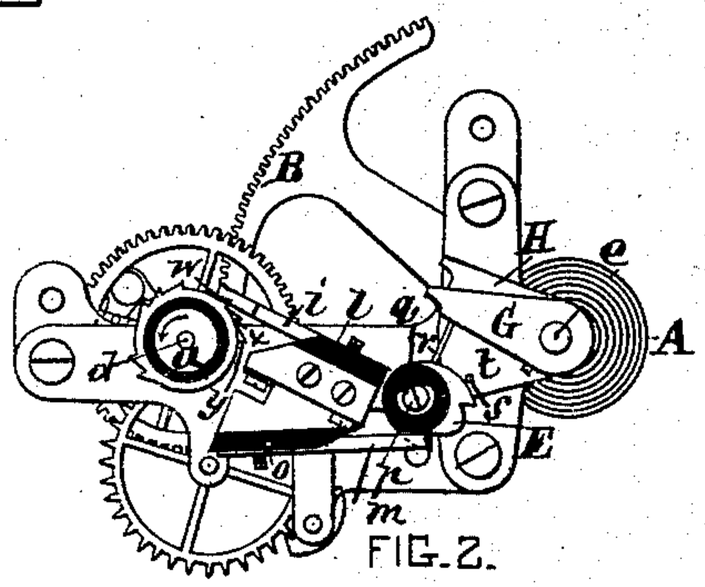


FIG. 2.

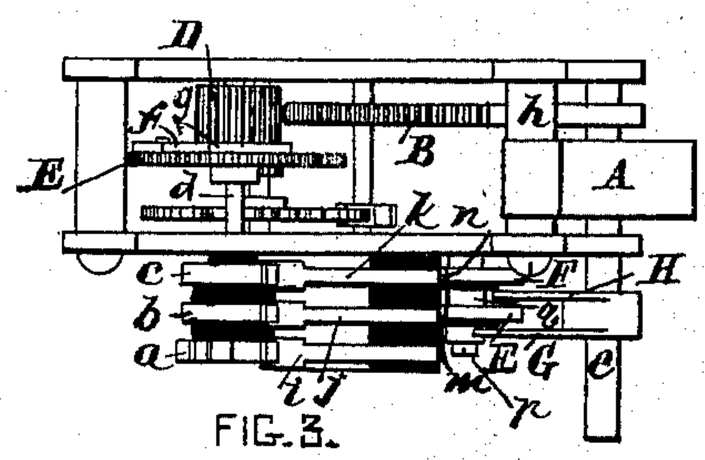


FIG. 3.

WITNESSES:

Wm. E. Woodward,

Edw. Dummer.

INVENTOR:

William E. Decrow.

(No Model.) 2 Sheets—Sheet 2.

W. E. DECROW.

ELECTRIC SIGNALING APPARATUS.

No. 413,436. Patented Oct. 22, 1889.

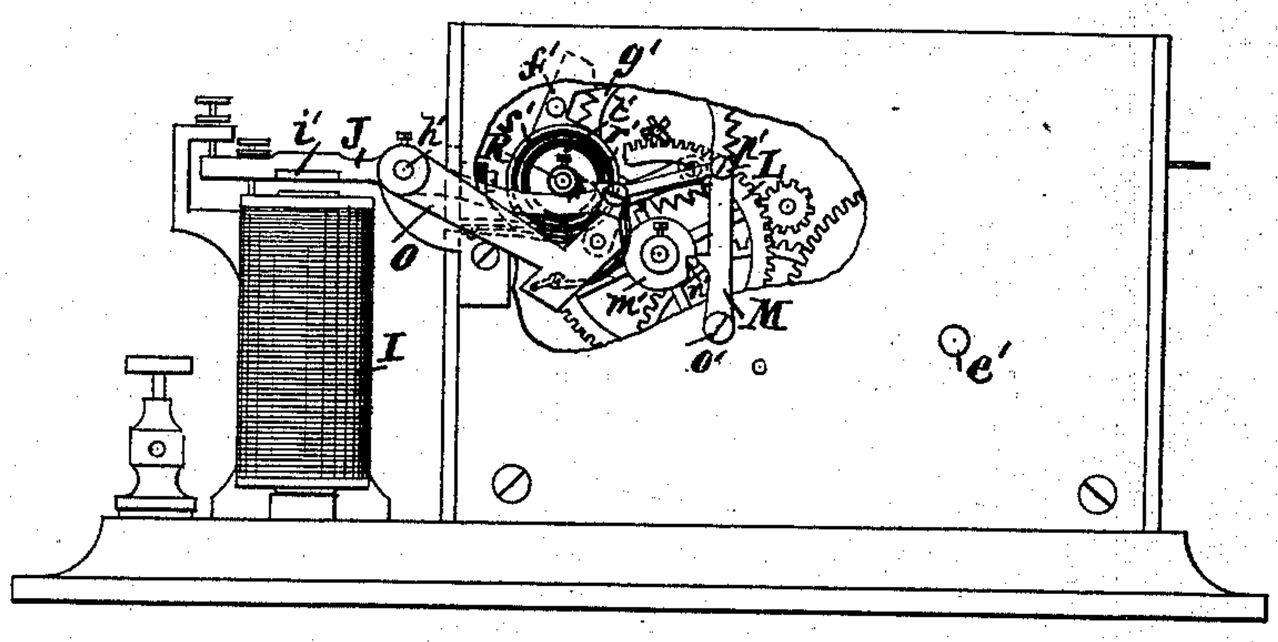


FIG. 6.

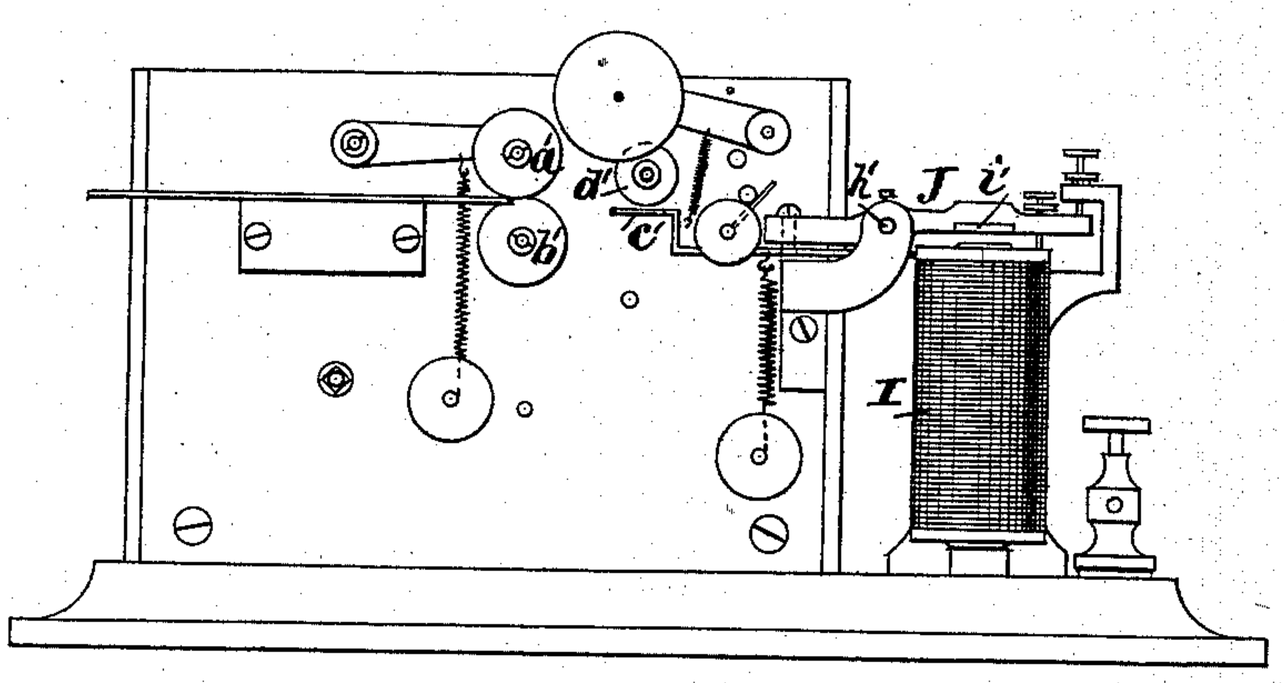


FIG. 7.

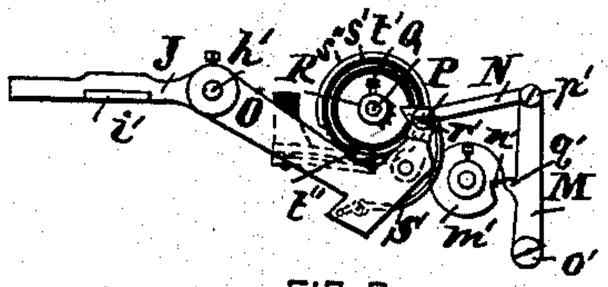
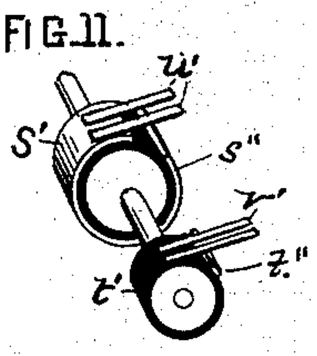


FIG. 9.

FIG. 11.



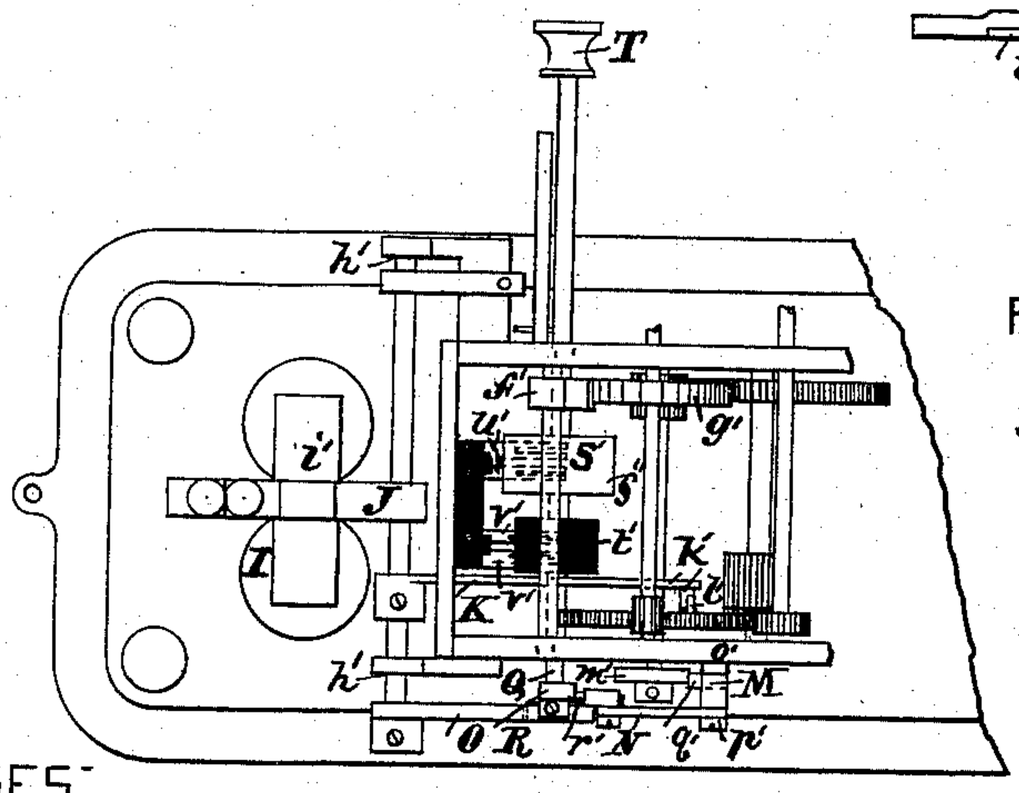


FIG. 8.

WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

WILLIAM E. DECROW, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE GAMEWELL FIRE-ALARM TELEGRAPH COMPANY, OF NEW YORK, N. Y.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 413,436, dated October 22, 1889.

Application filed April 1, 1889. Serial No. 305,639. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. DECROW, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Electric Signaling Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to electric signaling apparatus, especially adapted to be employed in a municipal or police signal system, in which a series of signal-boxes or sub-stations are connected by an electric circuit with a main station.

In accordance with the invention, an operator at any one of the transmitting or sub stations may, by the simple act of swinging a lever through any one of several different distances or arcs, cause a record to be made at the receiving or main station—as, for instance, by printing on a strip of paper characters to designate the number of the sub-station—and also, when the lever is swung through a certain one of said arcs, to bring into action an audible signal, as the ringing of a bell, and through another of said arcs bring into action a visible signal, as by means of an indicator which will display the number of the sub-station.

My invention consists in the devices and combinations of devices hereinafter set forth, and specifically pointed out in the claims.

In the drawings, (two sheets,) Figure 1 indicates three sub-stations and the main station and electric connections therefor, a sufficient part of the mechanism at one sub-station and at the main station for the purposes of this figure being shown, while the boxes at the other sub-stations are merely outlined on a smaller scale. Fig. 2 is an enlarged elevation of parts of the transmitting mechanism at the sub-station. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is an elevation of certain parts shown in Fig. 2 in other positions during their operation. Fig. 5 shows the levers *i j k m n* removed to positions one above the other, their electric connections being indicated in such a manner as to more clearly illustrate such connections and their office. Fig. 6 is a side elevation of the recording mechanism and devices connected therewith at the main station, drawn on a larger scale than corresponding parts in Fig. 1; and Fig. 7 is an elevation of the reverse side of the same. Fig. 8 is a plan view of certain parts shown in Fig. 6. Figs. 9 and 10 show details. Fig. 11 shows the wheels *s'* and *t'* and brushes therefor inverted and in perspective.

At each sub-station are several wheels—three, *a*, *b*, and *c*, for the purposes herein specified—which are on a shaft *d* to revolve as one. The shaft *d* is caused to revolve by means of a spring A, the gear-segment B, fixed on a shaft *e*, and the intermediate gearing shown. On swinging the segment B downward by means of the hand-lever C, (shown only in Fig. 1,) fixed on the same shaft, the spring A is brought under tension and the pinion D revolved in one direction, while the wheels *a*, *b*, and *c* are not revolved, since a pawl *f*, pivoted to the gear E, slips over a notched disk *g*, fixed to the pinion D. Upon release of the lever C by the hand the action of the spring causes a reverse movement of the segment B, and the pawl *f*, engaging with a notch on disk *g*, revolution of the wheels *a*, *b*, and *c* in the direction indicated by the arrow, the segment B coming to a stop provided by the fixed frame-piece or post *h*. The movement of this clock-work is regulated in the usual manner by the pallet and escapement-wheel shown.

There are three levers *i*, *j*, and *k*, pivoted on the same line at *l*, but insulated from each other when swung from their contact-points and the supporting frame-work. Each of these levers is swung by means of a certain projection or certain projections on the periphery of the corresponding one of the wheels *a*, *b*, and *c*.

There are two levers *m* and *n*, which are pivoted at *o* on the same line, also insulated from each other when swung from their contact-points and the frame. On a stud *p* are two eccentric-disks E and F, pivoted on the stud, but independently with reference to each other. Each of these disks is located so as to swing the corresponding one of the levers *m* and *n* which bears thereon. Fixed to each of these disks is a plate or projection *q*

at the side thereof. Fixed on the shaft *e* are two like arms G and H, their outer ends located at different peripheral points. If the shaft *e* be rotated a sufficient distance by swinging the lever C downward, then the arm G will come in contact with the projection *q* on the disk E and move this disk into position illustrated by Fig. 4, and thus swing the outer end of the lever *m* downward. If the lever C be swung downward still farther, then a similar action of arm H, disk F, and lever *n* will occur. On the return movement, under the action of the spring A of the shaft *e* and the arms G and H, the disks E and F, one or both, are returned to their normal position by a pin *r*, fixed to each of these disks, and pins *s*, fixed to a plate or arm *t*, fastened to the shaft *e*. Notches on the periphery of each of the disks E and F are shown, which, together with suitably-formed ends of the levers *m* and *n*, will operate to retain each disk and corresponding lever in the position set, by means of the corresponding arm or pin fixed to the shaft *e*, until acted on again by the arm or pin. The levers *m* and *n* will return to their normal position under the action of springs, as illustrated in the case of one lever *m* in Fig. 4. The circuit is completed in the box by means of the levers and contact-points thereof, as illustrated particularly by Fig. 5. Thus from post *u* the line of the circuit extends to the lever *n*, and from the lever *i* to the post *v*. The contact-points for the levers *m* and *n* are connected with each other and also with each of the levers *j* and *k*, while the contact-points for each of the levers *i* and *j* are connected with the lever *m*, and the contact-point for the lever *k* is connected with the lever *n*. Such being the arrangement and each of the levers being normally on its contact-point, it appears that if both the levers *m* and *n* are unmoved from their contact-points when the levers *i*, *j*, and *k* are swung one after the other, each from its contact-point, the swinging of the one *i* only will cause a breaking of the circuit; but if the lever *m* has been swung from its contact-point the swinging of either of the levers *i* and *j* will break the circuit. If both the levers *m* and *n* have been swung from their contact-points, then the swinging of each of the three levers *i*, *j*, and *k* will break the circuit. Since rest or movement of each of the levers *m* and *n* is determined by the distance through which the lever C is swung, it follows that if the lever C be swung from the normal position shown to a point 1, for instance, the circuit will be broken, when the wheels *a*, *b*, and *c* are revolved, only by and according to the projections on the wheel *a*. If the lever C be swung to a point 2, the circuit will be broken by and according to the projections on both the wheels *a* and *b*, and if the lever C is swung to a point 3 the circuit will be broken by means of and according to the projections on the three wheels *a*, *b*, and *c*.

At the main or receiving station I prefer to combine certain novel devices hereinafter described with a well-known printing-register. It is unnecessary to describe such register in detail in order to fully set forth the present invention. The strip of paper on which the characters are to be printed is fed by means of the rollers *a' b'*, which carry the strip between the platen *c'* and the press-roller *d'*. These rollers are rotated by means of a spring (not shown) on a shaft *e'*, and by the train of gearing shown, the movement of which is regulated by a pallet *f'* and escapement-wheel *g'*. The printing is done by means of an electro-magnet I, lever J, pivoted at *h'* and bearing armature *i'*, and the platen *c'*. The clock-work is released by means of an arm K, fixed to the armature-lever, and which bears a pin *k'*, that meets a pin *l'* on one L of the gears, as shown. The magnet I is to be subject to the current on the main circuit which connects the several sub-stations with the main station. This may be done by inserting the coils of the magnet directly in this circuit, as shown, or in another circuit controlled by a relay the coils of which are in the main circuit, as is common.

On the same shaft with the gear L is a disk *m'*, having a notch *n'* through sufficient length of the periphery thereof to effect the result hereinafter specified. To the frame is pivoted at *o'* a lever M, to which is pivoted at *p'* an arm N. Fixed to the armature-lever is an arm O. This arm is connected with the arm N by a link P, which is pivoted to the outer end of each.

On a shaft Q having bearings in the frame of the printing-register, but having no engagement with the gearing thereof, is a disk R, provided with a number of ratchet-teeth on its periphery. On the lever M is a projection *q'*, which bears on the periphery of the disk *m'*, except when opposite the notch *n'*. When opposite this notch the projection *q'* will enter the same, since the lever M will be swung therefor by means of a spring S. When this lever is so swung, a pawl *r'* or the beveled end of the arm N will engage with a tooth on the disk R. If the armature-lever is swung, the outer end of the arm O moving upward while the pawl *r'* is in engagement with a tooth on disk R, the shaft Q will be rotated a slight distance. The disk R may be returned to its normal position by hand, there being a finger-piece T on the shaft Q for that purpose. On the shaft Q are fixed two wheels *s'* and *t'*. One *s'* of these wheels has an insulated metallic surface *s''* throughout the greater part of its periphery. The other *t'* has a narrow metallic insulated portion *t''* on its periphery. On the wheel *s'* bear two insulated brushes *u'*, and on the wheel *t'* bear two insulated brushes *v'*.

In the circuit with the magnet I is a visual indicator U, which may be of a well-known construction and introduced into the circuit in the usual way. A wire or electric connec-

tion extends from the circuit on each side of the indicator U to one of the brushes u'. Thus these connections, brushes, and metallic piece s'' will make a shorter circuit than through the indicator U and cut out the latter. Connected with each of the brushes v' is a wire or electric connection extending to each side of an ordinary electric bell V, which is thus brought into a short or local circuit, including a battery, and completed by the metallic piece t''.

The break in the conducting-surface s'', the conducting-piece t'', the brushes u' and v', and the disk R are so adjusted with reference to each other that when the disk R retains the normal position shown the brushes u' will be on the metallic surface s'' and the brushes v' will not be on the metallic piece t'', so that the indicator U will be cut out of its circuit and the circuit for the bell V broken. Therefore neither the indicator nor bell will act when there is a single break of the main circuit. This single break will, however, cause the clock-work to be released, so that the feed-rollers of the printing-register will be rotated, and also the disk m'. After the notch n' has passed the projection q' there may be as many breaks of the main circuit as are required, and in the order necessary to print as desired. If, however, there is another break of the main circuit immediately after the first break and closing of the circuit, and while the notch n' is opposite the projection q', then the shaft Q and parts thereon will be rotated such a distance as may be by the action of the pawl r on one tooth on disk R, so that the brushes u' will still be on the conducting-surface s'', but the conducting-surface t'' will pass onto the brushes v'; hence the indicator will not act, while the bell will be sounded. The clock-work completing its action, the printing will be done by suitably-timed impulses, as before. If there are three breaks of the main circuit, two immediately after the one by which the clock-work is released and while the notch n' is opposite the projection q', then the pawl r' will act upon two of the teeth on the disk R and rotate the shaft Q sufficiently, so that the conducting-surface s'' will pass off from the brushes u', and also the conducting-surface t'' off from the brushes v'. Thus the indicator U will be cut into the circuit, while the circuit for the bell will be broken, so that the bell will not sound, while the indicator will display the required signal under the impulses by which the printed record is made.

On the wheel a of the transmitting device at the sub-station is a projection W, which during the first part of the revolution of the wheel swings the lever i so that a break is made in the main circuit, by which the clock-work of the printing-register is released. There being other projections in suitable order on the wheel a, corresponding impulses will be sent over the main line to print as required. On the wheel b there is a projection x to swing the lever j in immediate succession after the first projection on the wheel a. If the lever m has been previously swung from its contact-point by movement of the hand-lever C to point 2, as heretofore explained, then this projection on wheel b will cause a break of the main circuit at the proper time to close the local circuit for the bell V by means of the metallic piece on the wheel t'. There is also a projection y on the wheel c, which will cause the lever k to be swung immediately after the lever j, so that in case both the levers m and n have been swung from their contact-points there will be a break of the main circuit, which, with the two previous breaks caused by the two projections on the wheels a and b, will, by cutting the visual indicator U into line by means of the break of the metallic surface on the wheel s', bring the same into action under the same impulses as those by which the printing is done, as heretofore explained. Thus, if the lever C has been swung by hand to the point 1, the printing-register only will operate; if to the point 2, the bell will sound and printing will be done, and if to point 3 the bell will not continue to sound, printing will be done, and the visual indicator will operate. In the police system I desire to use the printing-register to make a permanent record of the number of the box or sub-station from which the signal is sent, the indicator to display temporarily such number, and the bell to call immediate attention at the main station for telephone or other purposes.

Each of the levers i, j, and k, together with the device for moving the same, is simply a circuit-breaker or means for causing electric impulses on the circuit, while each of the levers m and n is simply a shunting device.

I claim as my invention—

1. The combination of an electric circuit, two circuit-breakers operated successively at the transmitting-station, a shunt device for bringing one of said circuit-breakers into the circuit, the other circuit-breaker being normally in the circuit, clock-work at the receiving-station controlled by a magnet in the circuit, a short or local circuit at the receiving-station, and a circuit-closer t' for completing said local circuit, rotated by the action of said magnet and clock-work, substantially as and for the purposes set forth.

2. The combination of an electric circuit, three circuit-breakers operated successively at the transmitting-station, two shunt devices for bringing two of said circuit-breakers into the circuit, the other circuit-breaker being normally in the circuit, automatic mechanism at the receiving-station controlled by a magnet in the circuit, a visual indicator normally cut out of said circuit, and a local circuit at the receiving-station, a circuit-closer s' in a shunt around said indicator, and a circuit-closer t' in said local circuit, said circuit-closers being operated by the action of said

magnet and mechanism, substantially as and for the purposes set forth.

3. The combination of an electric circuit, two circuit-breakers operated successively at the transmitting-station, a shunt device for bringing one of said circuit-breakers into the circuit, the other circuit-breaker being normally in the circuit, automatic mechanism at the receiving-station controlled by a magnet in said circuit, a visual indicator normally cut out of said circuit, and a circuit-closer *s'* for bringing said indicator into the circuit, said circuit-closer being in a shunt around the indicator and rotated by the action of said magnet and automatic mechanism, substantially as and for the purposes specified.

4. The combination of an electric circuit, two circuit-breakers, one normally in said circuit and the other in a shunt-circuit, two wheels to revolve together, each provided with one or more projections to operate said circuit-breakers, automatic mechanism for causing revolution of said wheels, a lever for closing the shunt-circuit, and a lever and a gear-segment on a spring or motor-shaft for causing action of said mechanism and for swinging said device for closing the shunt-circuit, substantially as described.

5. The combination of an electric circuit, three circuit-breakers, one normally in said circuit and each of the other circuit-breakers in a shunt-circuit, three wheels to revolve together, each provided with one or more projections to operate said circuit-breakers, automatic mechanism for causing revolution of said wheels, two independent levers for closing the shunt-circuits, and a lever and a gear-segment on a spring or motor-shaft for causing action of said mechanism and for swinging the levers for closing the shunt-circuits, substantially as and for the purposes set forth.

6. The combination of a wheel *m'*, provided with a notch *n'*, automatic mechanism for rotating said wheel, an electro-magnet for releasing said mechanism, an armature-lever and arm O thereof, a lever M, provided with a projection to enter said notch, an arm N, pivoted to the lever and providing a pawl, a wheel provided with ratchet-teeth for engagement with said pawl, and a circuit-closer on the shaft of said ratchet-wheel, substantially as described, and for the purposes set forth.

WM. E. DECROW.

Witnesses:
WM. E. WOODWARD,
EDW. DUMMER.