(No Model.) 2 Sheets—Sheet 1.

M. MARTIN.

ELECTRIC SIGNALING APPARATUS

No. 454,973. Patented June 30, 1891.

Fig. 1,

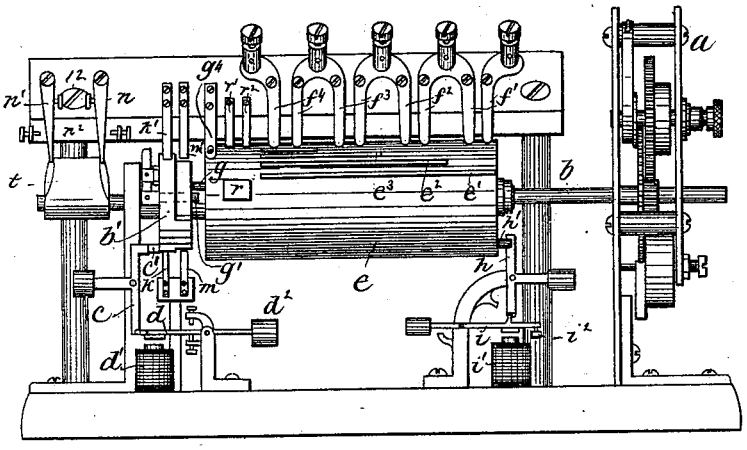


Fig. 4,

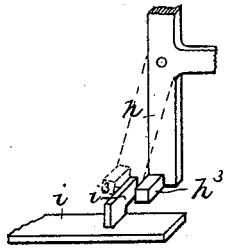


Fig. 2,

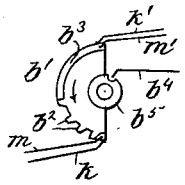


Fig. 3,

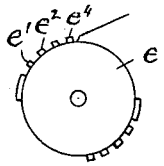
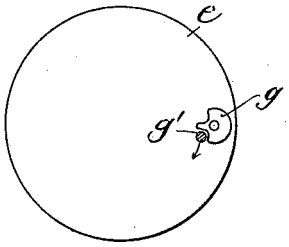


Fig. 5,



Witnesses.
Jas. J. Maloney.
M. E. Hall

Inventor,
Morris Martin,
by Jo. V. Livermore
Att'y.

(No Model.) 2 Sheets—Sheet 2.

M. MARTIN.

ELECTRIC SIGNALING APPARATUS

No. 454,973. Patented June 30, 1891.

Fig. 6,

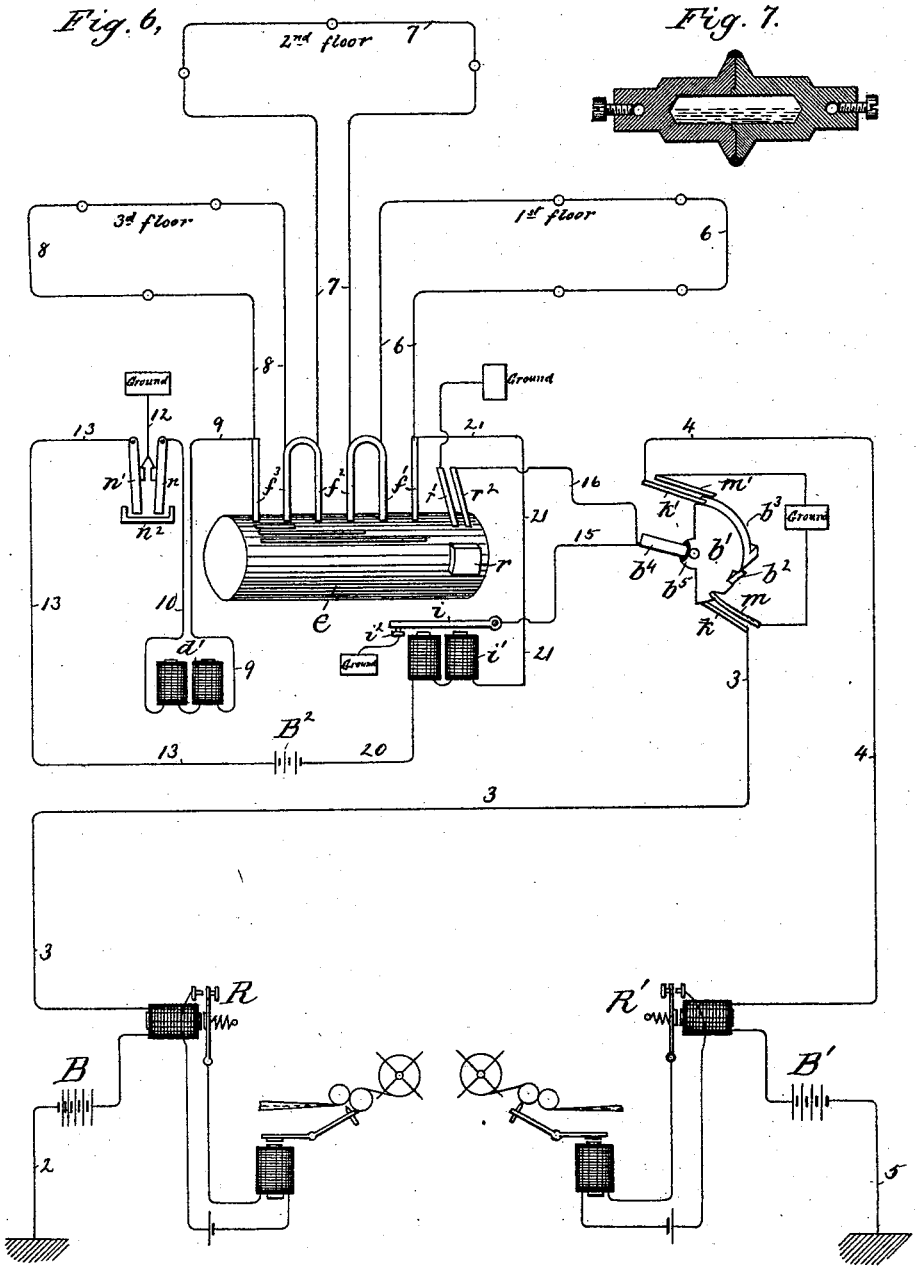


Fig. 7.

Witnesses,
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Atty.

UNITED STATES PATENT OFFICE.

MORRIS MARTIN, OF MALDEN, ASSIGNOR TO FREDERICK P. FISH, OF CAMBRIDGE, MASSACHUSETTS.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 454,973, dated June 30, 1891.

Application filed November 5, 1888. Serial No. 289,961. (No model.)

To all whom it may concern:

Be it known that I, MORRIS MARTIN, of Malden, county of Middlesex, and State of Massachusetts, have invented an Improvement in Electric Signaling Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

My invention relates to an electric signaling apparatus, and is shown as employed for the transmission of fire-alarms automatically, although the same apparatus might be employed for transmitting other information, and might be operated by hand or otherwise, instead of automatically by a rise in temperature.

The apparatus comprises a signal-transmitter connected in circuit with a signal-receiving station and controlled as to its operation by a local circuit, the invention consisting mainly in novel features of construction of the said transmitting apparatus and in combinations and arrangements of the parts of said apparatus with the main circuit, connecting it with the signal-receiving station and with the local circuit by which it is controlled.

For convenience in description the apparatus will be regarded as intended for automatically transmitting an alarm when a fire breaks out, this being the use to which the apparatus is generally put, and there will be a transmitter at each building or group of buildings to be protected, which transmitter, when operated, will send a signal to a main or receiving-station, which signal indicates the locality of the transmitter, like the usual fire-alarm or district signal-receiving apparatus. The said transmitter is controlled in its operation by one or more local circuits extending through the building or group of buildings to be protected, and so arranged that when the transmitter is set in operation by the proper change in any of said local circuits it transmits not only the signal indicating the general locality, but also an additional signal indicating the particular part of the building or group of buildings in which the fire has occurred, or the change in the local circuit has been otherwise produced that sets the transmitter in operation.

Several transmitters may be arranged in one and the same main circuit; but one only of said instruments is herein shown, as all will be of substantially the same construction.

The transmitter comprises a break-wheel or equivalent automatic signaling-surface controlling the main circuit, and a motor by which said break-wheel is operated, and a detent for said break-wheel controlled by the local circuit, in combination with another signaling device, which is the same in effect as and may be regarded as a set of simultaneously-moving break-wheels, which device or set of break-wheels is actuated by the same motor as the main break-wheel, but is controlled by a separate detent and so connected with the motor that the main break-wheel may move independently of the said connected set of break-wheels or drum if the detent for the main break-wheel alone is operated, but will accompany the said main break-wheel in a greater or less portion of its movement if both detents are operated simultaneously. The detent of the main break-wheel is arranged to be operated by a defect in the local circuit other than an actual rupture of the same—such, for example, as a weakening of the battery or grounding of the local circuit at any point—while both detents are operated simultaneously if the local circuit is actually broken at any point, so that the main locality-signal is transmitted alone if there is a defect in the local circuit; but both main and local circuits are transmitted if the local circuit is ruptured, as occurs upon the breaking out of a fire.

Figure 1 is a front elevation of a transmitting-instrument forming part of a signaling apparatus embodying this invention; Figs. 2, 3, and 4, details to be referred to; Fig. 5, a modification to be referred to; Fig. 6, a diagram showing the circuits and the relations of the various parts of the apparatus thereto, and Fig. 7 a detail illustrating a thermostatic circuit-breaker that may be employed in the local circuit.

The transmitting-instrument represented in Fig. 1, which constitutes one of the main novel features of the invention, comprises a clock-work or motor *a*, which may be such as commonly employed in fire-alarm-signal

boxes, the actuating-spring of said motor being normally wound up, so that the motor tends to rotate the shaft b, except when such rotation is positively prevented by the detent, which will be hereinafter described. The said shaft b has fixed upon it a break-wheel or signaling-surface b', the specific construction of which is best shown in Fig. 2, and will be described later on, it being sufficient for the present to understand that the said break-wheel controls a main circuit and effects the transmission of a signal therein as does the break-wheel of the well-known fire-alarm and district signaling-boxes. The said break-wheel b' and the shaft b and motor a are normally arrested and retained inoperative by a detent, which may be of any usual construction, being shown as consisting of a lever c, one arm of which engages a projection c' on the break-wheel b', and the other arm of which is controlled by the armature-lever d of an electro-magnet d' in such manner that said lever c is retained in engagement with the other detent member c' as long as the armature remains attracted, but is released when the said armature is retracted by the demagnetization or weakening of the magnet d', the said armature being provided with a strong retractor (shown as a counter-weight) d^2, which will retract the armature before the magnet d' is wholly demagnetized, and will thus be operated by a reduction of the current in said magnet below the amount required for the safe or normal operation of the apparatus without the total interruption of the said current. The shaft b also has loose upon it a drum e, (shown in end elevation in Fig. 3,) composed of insulating material provided with strips e' e^2, &c., of conducting material co-operating with springs f' f^2 f^3, &c., which rest against the surface of said drum, so that in the rotation of the said drum the said pairs of springs will be alternately connected and disconnected, or the circuit from one to the other of a given pair of springs will be alternately broken and closed, as in the operation of an ordinary break-wheel. The said strips e' e^2, &c., are of different lengths, one only co-operating with the pair of springs f', while two of them co-operate with the pair of springs f^2 and three with the pair of springs f^3 and four with the pair of springs f^4, so that said drum is the same in effect as a number of mechanically-connected break-wheels having different numbers of teeth or projections, the one co-operating with the pair of springs f', for example, having one tooth, the one with the pair f^2 two teeth, the one with the pair f^3 three teeth, and so on; but this portion of the apparatus will for convenience be hereinafter spoken of as the "drum" or "local" signaling device, as the different break-wheels or signaling-surfaces of which it is composed indicate the different parts of the locality which is characterized by the one main signal produced by the break-wheel b'.

There is a connecting medium between the break-wheel b' and drum e, which may consist merely of a projection g on the drum and the corresponding projection g' on the break-wheel, the former being normally placed just behind the latter, so as to admit of practically one complete rotation of the break-wheel b' before it engages the drum and tends to turn the latter positively with it. If desired, the said engaging device g g' may be constructed, as shown in Fig. 5, so as to permit two or more complete rotations of the break-wheel before the drum is positively engaged by it, and in either case the friction of the springs f' f^2, &c., alone or in connection with an additional friction device g^4 will be sufficient to overcome the friction between the drum e and shaft b and prevent the rotation of the former until positively engaged by the break-wheel b, to which the power of the motor a is directly applied. The drum e is also provided with a detent, which may consist of a lever h, one arm of which engages a projection h' on the drum and the other arm of which has a lateral projection h^3, that is engaged by a projection i^3 (see Fig. 4) on the armature-lever i of an electro-magnet i', arranged to retain the detent h h' in engagement while said armature is attracted, but to disengage the said detent when the said armature is once retracted, and thereafter to permit the free rotation of the drum e, whatever may be the position of the armature-lever i. The construction of this detent is substantially like that of the detent c c' d of the main break-wheel, the engaging projections on the armature-lever and detent-lever being so arranged that when the armature is retracted the projection on the detent-lever passes wholly by that on the armature-lever, as will be readily understood from Fig. 4, thus leaving the detent wholly disengaged and also leaving the armature-lever free to vibrate under the influence of its magnet.

The magnet i' is in the same circuit as the magnet d', but has a weaker retractor and is in a different portion of said circuit, as will be hereinafter described, so that the weakening of the current or grounding of the circuit that will cause the release of the armature of the magnet d' will not release the armature of the magnet i', and consequently such a weakening of the current or grounding of the circuit will cause the release of the break-wheel b', but not of the drum e, and under such circumstances the break-wheel b' will rotate one or more times until arrested by the engagement of the parts g g', and then further movement of the said break-wheel and of the motor a will be prevented by the detent h h' for the drum, but will take place when the said drum-detent is disengaged. If, however, both detents are operated simultaneously, as by a complete rupture of the circuit through the magnets d' and i', the break-wheel b' will be operated by the motor, as before, for one or more turns, while the drum is held stationary by the friction device before

mentioned, but as soon as the parts *g g* engage; the drum will be caused to rotate with the break-wheel and both will continue to turn together until the motor runs down.

The object of the construction thus far described and the mode of operation of the devices in the entire apparatus will be best understood by referring to the diagram, Fig. 6.

The main circuit connecting the transmitter apparatus thus far described with the signal-receiving apparatus at the main or signal receiving station is shown as of substantially the same character as that shown and described in Patent No. 341,115, dated May 4, 1886, which may be referred to for a fuller explanation of the various arrangements which will now be briefly described. The said main line has both terminals grounded at the main office, and includes two independent receiving-instruments R R′, of usual construction, one near each terminal, and also has near each terminal batteries B B′ of unequal amount and set, with like poles to line, so that their currents normally oppose one another, leaving, however, a sufficient amount of current on the line to show whether or not the said line is unbroken by instruments which are not shown and need not be described, as they form no part of the present invention.

The main line may be traced as follows: Starting from the ground at 2 at the receiving-station, it passes through one battery B and receiving-instrument R, and thence, as shown at 3, to the transmitting apparatus of the first out-station, where the circuit is normally completed, through the break-wheel *b′* to the portion 4 of the main line, leading onto the next station, and finally returning to the main office and passing through the receiver R′ and battery B′ to the ground at 5, making practically a metallic circuit, but with a ground connection at the receiving-station between the two batteries B and B′, so that a ground connection at any outside point will make two complete independent ground-circuits, one through the battery B and instrument R and the other through the battery B′ and instrument R′. The signals are transmitted by first grounding one side of the line at the transmitting-station and opening and closing the said grounded circuit and then repeating the same operation upon the line at the other side of the transmitter, so that if the line is in working condition the signal will first be received on one instrument, as R, and then on the other instrument, as R′; but if the line at either side of the transmitter is broken or grounded the signal will still be properly received by the instrument in the other side of the line. The construction of the break-wheel *b′* for effecting this result is best shown in Fig. 2. The said break-wheel consists, practically, of half a disk, which is again divided into two parts, or is, in other words, made thick enough in the direction parallel with its axis of rotation to co-operate with two springs *k* and *m*, placed side by side. A second set of springs *k′* and *m′* are placed nearly diametrically opposite the springs *k* and *m*, and when the break-wheel is wholly at rest in its normal position both the springs *k k′* are in contact with it, the said springs constituting the terminals of the parts 3 and 4 of the main line at either side of said break-wheel, as shown in Fig. 6, so that the main line is normally closed or completed through the said break-wheel, as before stated. The springs *m* and *m′* are each connected with the ground, as shown in Fig. 6, and so arranged that neither of them touch the break-wheel when arrested in the normal position, the said wheel being cut away or insulated beneath them at this point.

The projections or teeth b^2 of the break-wheel, which operate to open and close the circuit controlled by it in the usual manner, are wide enough to be touched by adjacent pairs *k m* and *k′ m′* of the springs, and when the wheel begins to rotate in the direction of the arrow, Fig. 2, it will first pass from beneath the spring *k′*, thus leaving the side 4 of the main circuit open during the first half-rotation of the said break-wheel, in which the notched surface passes beneath the springs *k m*, each wide projection of said surface connecting said springs, and thus connecting the side 3 of the main circuit with the ground through the spring *m*, and each notch of the break-wheel opening such ground-circuit in the well-known manner, and thus producing a number of operations of the receiving-instruments R, dependent on the arrangement of the teeth and notches in the break-wheel *b′*, in the usual manner. During the first half-rotation the break-wheel will thus pass under the springs *k m*, and in the next half-rotation it will co-operate with the springs *k′ m′*, and thus close and break a ground-circuit from the transmitter to the portion 4 of the main line, including the receiving-instrument R′ at the main station. A portion of the part of the break-wheel that co-operates with the grounded springs *m m′* is cut away, as shown at b^3, Fig. 2, so that during a corresponding portion of the rotation of the said break-wheel the springs *k* and and *k′* are connected with the break-wheel, but the latter is not connected with the ground through the springs *m* and *m′*, and consequently, after the signal has been transmitted through the side 3 of the main line by the notched part b^2 of the break-wheel, the said side 3 is retained in connection with the break-wheel, which no longer, however, itself effects the said circuit, and in like manner the side 4 of the main circuit is retained in connection with the break-wheel for a certain period after the signal of said break-wheel has been transmitted over the portion 4 of the main line. This connection of the break-wheel with the main line is for the purpose of transmitting the local signal, as will now be explained.

The teeth or notches of the break-wheel by which its signals are transmitted only occupy a portion of its periphery, so as to give time for the transmission of a local signal after the main signal, and by the same movement of the break-wheel shaft.

The relation of the local signaling instrument or drum e and its co-operating springs $f' f^2$, &c., to the break-wheel and main circuit will now be explained. The said pairs of springs are connected in series with one another, as shown, one spring of one pair being in this instance made of the same piece of sheet metal with the adjacent spring of the next pair. The two springs of each pair are also normally connected together by loops 6 7 8, (see Fig. 5,) extending to different parts of the general locality indicated by the signal of the main break-wheel. For example, if the main break-wheel indicates a given block or building in the city, the loops 6 7 8 may represent different floors of the said building or different buildings of the said block or group of buildings.

The local circuit that controls the operation of transmitting device contains a battery B^2, one pole of which is connected, as shown at 20, with one terminal of the magnet i', that operates the detent for the drum, the other terminal of which is connected, as shown at 21, with one spring of the pair that is operated by the long strip only of the drum, from which the said local circuit is continued through the loop 6 to the other spring of said pair, and thence the local circuit passes directly to one spring of the next pair and through the loop 7 to the next spring thereof, and so on to the last spring of the last pair, which is connected, as shown at 9, with one terminal of the magnet d', that controls the detent for the break-wheel b', the other terminal of which magnet is connected, as shown at 10, with a switch n, which normally rests in contact with a piece connected with the ground at 12. The other terminal of the battery B^2 is connected by wire 13 with another switch n', which also normally rests against a contact-piece connected with the ground at 12. The connections 13 and 20, between the battery B^2 and the magnet i' and switch n', respectively, are short and may be wires that are wholly inclosed within the casing that contains the transmitting instrument and battery, and the magnet d' is thus practically interposed between the extreme end of the local circuit, beginning at 20, and the ground, so that a ground connection coming upon the said local circuit anywhere outside of the short wires 20 and 13 would short-circuit the magnet d', and consequently such a grounding of the local circuit at any point would release the detent of the main break-wheel b', but would not release the detent of the drum or local signaling device e, as the magnet i' would remain in the grounded circuit. The loops 6 7 8 normally close the connections between the pairs of springs $f f'$, &c., so that the strips $e' e^2$, &c., on the drum e would produce no material effect upon the current in the local circuit, so long as the loops 6 7 8 are in their normally-closed condition. The said loops each contain one or more circuit-breakers, which may be of any suitable or usual kind, the opening of any one of which causes the whole apparatus to operate as it demagnetizes both magnets $d' i'$ and releases the detent both of the break-wheel b' and drum, so that both will rotate, as before described, until the motor a runs down.

A suitable form of thermostatic circuit-breaker to be used for fire-alarm purposes is shown in Fig. 7, the same consisting of a conducting-reservoir made in two parts normally fastened together by easily-fusible solder, and said reservoir containing a volatile fluid which expands when the device is heated, and thus forcibly throws the two parts of the reservoir asunder when the easily-fusible solder is sufficiently softened by the rise in temperature. The local circuit is connected with the said separable parts of the reservoir, and is thus ruptured when the said parts are separated, as just described. When one of the loops, as 6, is thus broken, the circuit between the corresponding pair of springs f' is opened, except when the conducting-strip on the drum passes beneath them, so that said conducting-strip will produce a momentary closure of the local circuit, and the number of strips that co-operate with the springs between which the circuit-loop is broken thus determines the character of the signal. Thus if loop No. 6 is broken, there will be one such closure, if loop No. 7 two such closures, and so on, and if more than one loop is broken the signal consisting of the largest number of closures will be transmitted. The conducting-strips are arranged on the drum in such position that they co-operate with the springs during the part of the rotation in which the ground-spring m or m' of the main break-wheel is over the cut-away portion of said main wheel, and such closures of the local circuit are caused to transmit signals in the main circuit, as follows: The armature-lever i of the magnet i' is connected, as shown at 15, with a spring b^4, that makes contact with the hub b^5 of the wheel b', except when the latter is held in its normal position by its detent, as will be readily understood from Fig. 2. The front stop i^2 for said armature lever is connected with the ground, so that as the said armature-lever responds to the closures in the local circuit it will cause a ground connection to be made through the break-wheel b' to the spring k and portion 3 of the main circuit during one-half of the rotation of said break-wheel, and to the spring k' and portion 4 of the main circuit during the other half-rotation. The magnet i' is thus a relay operated by the local circuit and itself operating the main circuit.

The strips on the local signaling-drum are duplicated at opposite sides, as shown in Fig.

3, so as to operate in both parts of the rotation of the main break-wheel, and thus transmit the local signal to both receiving-instruments at the main office if the main circuit is in working condition.

In order to prevent the possibility of a ground connection at some point on the local circuit between the battery and magnet i' on one side and the break by which the local circuit is operated on the other side from making a circuit for the magnet i', and thus preventing it from responding to the breaks and closures of the local circuit produced by the drum, the shaft b is provided with a cam t, which immediately after the shaft is released operates the switches $n\ n'$, separating them from the ground connection 12 and moving them into contact with a connecting-piece n^2, which thus completes the local circuit, so that a ground connection at any other point on the local circuit would not affect its operation.

The operation of the devices thus far described may be briefly stated as follows: The parts being normally in the condition represented in the diagram, if the current in the local circuit should weaken so as to endanger failure in case the apparatus were to be operated, or if a ground connection should come on the said local circuit the magnet d' would release its armature and permit the break-wheel b' to be operated; but the magnet i' would still hold its armature and thus keep the detent in a position to prevent movement of the drum. The break-wheel b' would thus be permitted to make one or more complete rotations, according to the construction of the engaging devices $g\ g'$, and would then be arrested, and consequently the main signal, characteristic of the transmitting device and entire locality protected by the local circuits thereof, would be transmitted, but would not be followed by any local signal, and information would thus be given at the main office that something was wrong with the local circuit or apparatus, as the main signal, unaccompanied by the local signal, could only be produced in this manner. If, on the other hand, one of the loops 6, 7, or 8 of the local circuit were opened, both the detents would be released and the break-wheel b' would first make one or more rotations, sending in the main signal alone; but as soon as the device $g\ g'$ should become properly engaged the drum e would move with the break-wheel and the instrument would then transmit the main signal, followed by the local signal, which would indicate that a fire had broken out and would designate not only the general locality, but that particular part of the general locality which was occupied by the loop that had been broken. There is a possibility that both detents might be released without any of the loops 6 7 8 being broken—as, for example, by the breaking of the circuits outside of said loops—and it might be desirable to indicate at the main office that the drum had moved, even although the drum did not send any particular signal. Such an occurrence would be known by the fact that the main signal would be repeated a greater number of times than it would if the detent of the break-wheel only were disengaged; but, as a further means of distinguishing, the drum is provided with an additional signaling device arranged to operate after the main signal and before the local signal, such device consisting of a connecting-plate r, co-operating with springs $r'\ r^2$, the former connected with the ground, as shown in the diagram, and the latter connected by wire 16 with the spring b^4, so that when the contact r passes over the springs $r'\ r^2$ immediately after the projections of the break-wheel have passed the spring k or k' on one or the other side of the main line will be connected with the ground, and the contact r is made longer in the direction of rotation than the contacts of the break wheel or drum, so as to produce a dash, which distinguishes it from the dot-signal of the main break wheel and drum, and also serves to separate the main from the local signal, so as to avoid confusion in reading the signals.

It is apparent that if the main break-wheel detent had been released by derangement of the local circuit, such as before stated, the apparatus would still remain in proper condition to produce the main and local signals if one of the local circuit-loops should be broken, and when the apparatus is used as an automatic fire-alarm apparatus the reception of the main signal alone will call for an inspector to see what has happened to the local circuit and to repair the same and set the apparatus in its original condition; but the main signal accompanied by the local signal will be answered by sending the proper means for extinguishing the fire.

I claim—

1. The combination of a main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuits and a local circuit and series of distinct signaling-surfaces or break-wheels connected to move simultaneously, the co-operating members of which are permanently connected in series with one another in said local circuit, and a motor for actuating the said main break-wheel and a series of local circuit break-wheels, and a detent for said motor controlled by the said local circuit, substantially as described.

2. The combination of the motor and main break-wheel connected therewith with a set of connected break-wheels or signaling-surfaces and engaging projections between said main break-wheel and set of connected break-wheels, and independent detents for said main break-wheels and set of connected break-wheels, respectively, substantially as and for the purpose described.

3. The combination of the main circuit con-

necting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuit, and a set of connected break-wheels or signaling-surfaces, and a local circuit controlled thereby and engaging projections between said main break-wheel and set of connected break-wheels, and independent detents for the said main break-wheel and set of connected break-wheels, and electro-magnets controlling said detents included in said local circuit, substantially as described.

4. The combination of the main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuit, and a set of connected break-wheels or signaling-surfaces, and a local circuit controlled thereby and engaging projections between said main break-wheel and set of connected break-wheels, and independent detents for the said main break-wheel and set of connected break-wheels, and electro-magnets controlling said detents included in said local circuit, the armature of the magnet controlling the main detent being adjusted to operate upon a smaller change in the current strength than that required for operating the magnet controlling the detent for the set of connected break-wheels, substantially as described.

5. The combination of the main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuit, and a set of connected break-wheels or signaling-surfaces, and a local circuit controlled thereby and engaging projections between said main break-wheel and set of connected break-wheels, and independent detents for the said main break-wheel and set of connected break-wheels, and electro-magnets controlling said detents included in said local circuit, the armature of the magnet that controls the detent for the set of connected break-wheels being connected with the main circuit, as set forth, whereby signals or changes in the local circuit produce corresponding signals or changes in the main circuit, substantially as described.

6. The combination of the main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuit, and a set of connecting-wheels or signaling-surfaces, and a local circuit controlled thereby and engaging projections between said main break-wheel and set of connected break-wheels, and independent detents for the main break-wheel and set of connected break-wheels, and electro-magnets controlling said detents included in said local circuit, the said local circuit having its terminals normally connected with the ground and including a battery placed near one of said grounded terminals, the magnet controlling the main break-wheel detent being placed near the other grounded terminal with substantially the whole local circuits and instruments therein between it and the battery, substantially as and for the purpose described.

7. The combination of the main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising a main break-wheel controlling said main circuit, and a set of connected wheels or signaling-surfaces and a local circuit controlled thereby and engaging projections between said main break-wheel and set of connected break-wheels and independent detents for the main break-wheels, and set of connected break-wheels, and electro-magnets controlling said detents included in said local circuit, the said local circuit having its terminals normally connected with the ground and including a battery placed near one of said grounded terminals, the magnet controlling the main break-wheel detent being placed near the other grounded terminal with substantially the whole local circuits and instruments therein between it and the battery, and a switch by which the terminals of the local circuit are disconnected from the ground and connected together when the break-wheel is set in operation, substantially as described.

8. The combination of the main circuit connecting signal transmitting and receiving stations with a transmitting-instrument comprising the main break-wheel controlling said main circuit, and a set of connected break-wheels the co-operating members of which are connected by portions of a local circuit extending to different localities and including circuit-breakers, said local circuit being electrically disconnected from the said main circuit, but controlling and governing the devices that operate to produce signals in said main circuit, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MORRIS MARTIN.

Witnesses:
JOS. P. LIVERMORE,
JAS. J. MALONEY.