2 Sheets—Sheet 1.

L. FINGER.

Electric Annunciators.

No. 213,282. Patented Mar. 18, 1879.

Fig. 1.

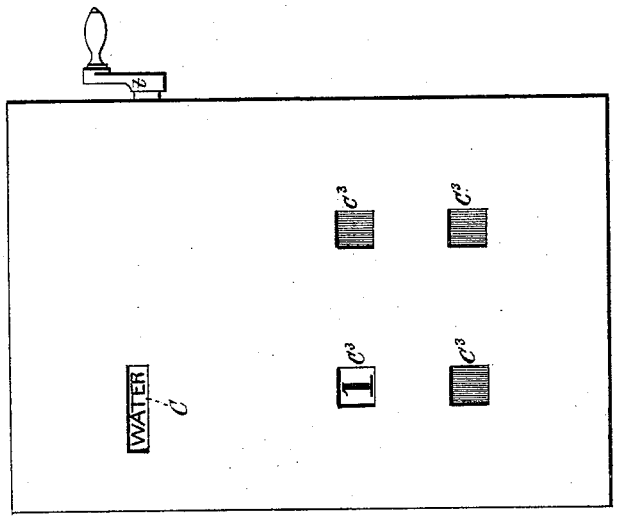
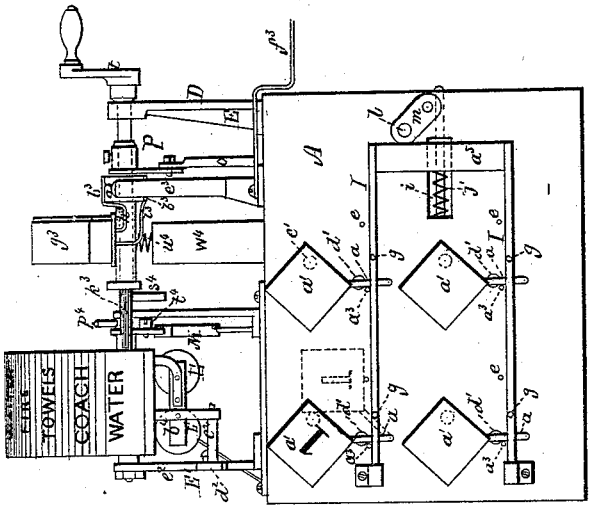


Fig. 2.



Witnesses.
F. Hunnewell.
W. E. Boardman.

Inventor.
Louis Finger.
G. Curtis. Atty.

2 Sheets—Sheet 2.

L. FINGER.

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Fig. 3.

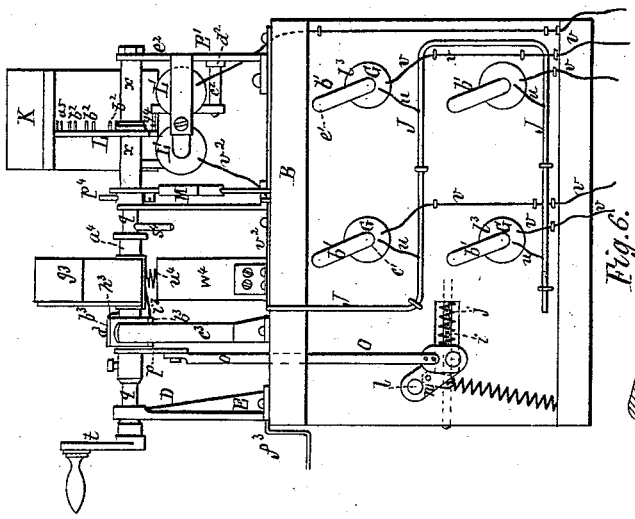


Fig. 6.

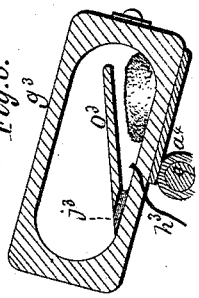


Fig. 7.

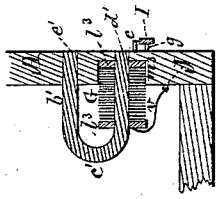


Fig. 8.

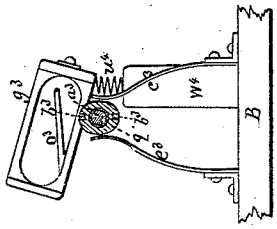


Fig. 4.

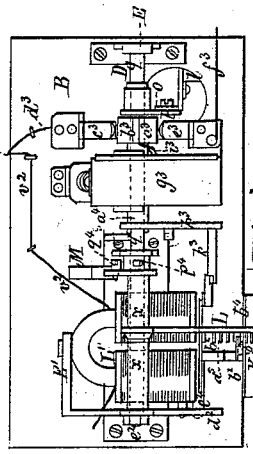
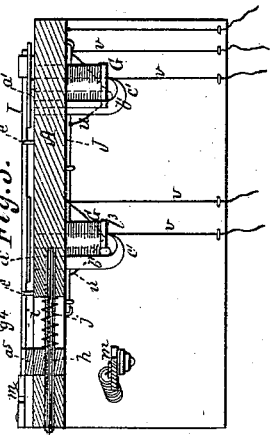


Fig. 5.



Witnesses.
F. Hunnewell.
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Louis Finger.
H. Curtis. Atty.

UNITED STATES PATENT OFFICE.

LOUIS FINGER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC ANNUNCIATORS.

Specification forming part of Letters Patent No. **213,282**, dated March 18, 1879; application filed July 27, 1878.

To all whom it may concern:

Be it known that I, LOUIS FINGER, of Boston, Suffolk county, Massachusetts, have invented certain Improvements in Electro-Magnetic Annunciators, of which the following is a specification:

In this annunciator I employ a semi-rotary or rocking shield or sign-card, mounted upon a rock-shaft and placed behind a window in the front of the case or display-board of the annunciator, this shield having inscribed, engrossed, or affixed upon its outer face a series of words or other characters, which designate the persons or articles which guests may be liable to require, and operated by an electric battery within the control of the guest in his room, in such manner that by pressing a knob in any room communication is established with the shield, and it is lowered to such an extent that one or the other of its characters is visible through the window, according to the number of pressures upon the knob, but one shield or character-sign being requisite for the entire number of rooms of any hotel or structure.

I further employ in this annunciator, and in connection with each room or location from which a call may be made, a tilting bar or armature bearing upon its upper end a card or plate, upon the face of which is engrossed a number or character indicative of the room or location with which any given card may correspond, the tilting armature being disposed near and to one side of the core of an electro-magnet, in order that when the circuit of the battery is closed the pole shall attract the rod, and the latter obtain such momentum as to pass beyond the influence of the magnet and bring up against a stop suitably placed to receive it, the series of arms being returned to their normal position, by a rod to which the said stops are attached.

The above elementary features of electric annunciators are shown and described individually and separately in Letters Patent of the United States issued to me, respectively, on the 5th day of May, 1874, and 11th day of August, 1874, the former embodying the semi-rotary character-shield, and the latter the tilting armature, carrying the card or plate which designates a given room; but I have in my present application combined these elements, and added features by which, in a compact and economical form, I avail myself of the valuable features of each and render them co-operative, while at the same time I dispose the two extremities of the core of each magnet in close proximity to the adjacent armature, but at variable distances from it, the strongest nearest the armature, this arrangement being such that the nearest and most highly-charged end or pole of the core first attracts the armature from its resting-place and to or slightly beyond a perpendicular, from which point the remote and weaker pole of such core attracts the armature, and generates such momentum in the latter that it is carried quite beyond the influence of the last-named pole and brings up against a stop, as before stated.

I further combine in this annunciator a novel method of prolonging the continuity of the circuit, which is closed by the pressure of the knob or circuit-closer when a call is made by a guest, the same being hereinafter described, the purpose of this portion of my present improvements being to avoid the frequent failures to ring the bell or signal in the office resulting from the hasty manner in which the pressure of the caller is applied to the knob.

The drawings accompanying this specification represent, in Figures 1 and 2, front elevations, in Fig. 3, a rear elevation, in Fig. 4, a plan, and in Fig. 5, a horizontal section, of an annunciator, or so much thereof as is requisite to illustrate my present improvements. Fig. 6 is a section of the rocking mercury-box, to be explained. Fig. 7 is a section of one of the magnets of the room circuit-closer, showing its application to the front of the core. Fig. 8 is a section of the circuit-closing mechanism which actuates the bell or signal.

In these drawings, A denotes the board or plate of an annunciator for supporting a greater part of the operative mechanism, a plate, A′, being disposed in front of this board, and pierced at its upper part by a window, C, while the lower part of such plate or front A′ is pierced by a succession of windows, C^3 C^3, &c., corresponding in number to the number of the

rooms or apartments to which the annunciator is adapted, and disposed opposite the number-cards a^1, hereinafter referred to.

To the lower part of the front A, I pivot, at their lower ends, a series of soft-iron tilting or rocking arms or armatures, a a, &c., to the top of each of which I affix a card or plate, a^1, a stop or abutment, a^3, being placed alongside each armature, against which the latter rests until attracted by the magnet.

In rear of the display-board A and of each armature a, I secure a series of electro U-magnets, G, the core b^1 of each of which is bent into the usual U form, c^1, one magnetic pole, d^1, of such yoke passing through, and the other, e^1, outside of, such coil, and the extremities of the two poles passing through the board A immediately in rear of some one of the armatures a, with which they operate.

The center of the lower and stronger pole, d^1, of each yoke c^1 is disposed slightly above and partially in advance of the pivot of each adjacent armature a when the latter is in an upright or normal position, while the other extremity, e^1, is disposed higher up and more remote from the adjacent armature, the arrangement being such that when the circuit of the battery is closed the pole d^1 first attracts the armature beyond a vertical position, the momentum thus acquired being sufficient to carry the armature beyond the influence of such pole d^1 and within the influence of the pole e^1, the latter serving to swing the armature so far beyond a perpendicular that such armature acquires considerable momentum, and passes, by its gravity, quite beyond the influence of the pole e^1, and against one of a series of stops, e e, &c., projecting laterally from the board A, where it will remain until returned to its normal position by one of a series of pins or studs, g g, &c., which are secured to the rear side of one of a series of long horizontal rods or shippers, I, which latter are supported at one end in suitable bearings attached to the front of the board A, and secured at the other end to an upright bar, a^5, which is formed with a projection, h, extending from its rear side through a slot, i, created in such board.

The windows C^3, before alluded to, are so disposed with respect to the armatures a and number-cards a^1 that when any one of the latter drops upon a call being made it is visible through the adjacent window, and will remain thus exposed to view until restored to its normal position, as hereinafter explained.

A coiled spring, j, is combined with the projection h and slot i in such manner as to force the shipper bar or rod I to the right and carry its stud g away from the armatures a when the latter are in their normal positions.

To force the shipper-rod I in the opposite direction and against the stress of the spring j, I employ a short horizontal rock-shaft, l, which passes through the board A at one end of the rods I, to the outer end of which shaft I secure a crank, m, and to its inner end a second crank, n, while to the wrist-pin of the latter I pivot the lower end of a pitman or connecting-rod, o, the upper end of such pitman being, in turn, pivoted to the wrist-pin of a pendent crank, p, the upper end of this latter crank being affixed to a rock-shaft, q, which is mounted in the standards E E′, before named as erected upon the shelf B, before named, the outer end of the shaft q being furnished with a crank, t, by which its movements are controlled.

The battery-wire is shown at J, and the two electric poles of each magnet G at u v, the former of which connects with the battery-wire, and the latter with some one apartment with which the annunciator is connected, a knob being placed in such room to establish electric communication in manner as now practiced in many hotels and other structures.

K in the drawings represents a sign or shield, which, in the present instance, is a plate in the form of a segment of a cylinder, of which the shaft g is the axis, the said shield being mounted upon such shaft by an arm and hub, x, or tubular shaft, in such manner as to turn freely upon it in the arc of a circle. Upon the shield K, I inscribe, engrave, or otherwise affix a series of words or characters designating the person or article wanted, such as waiter, matches, cigars, water, &c., these characters being placed horizontally upon the shield, and so as to intercept or coincide with the window C, the size of the latter being such that but one character is at a time visible through it.

A weighted arm or lever, M, projects rearward from the tubular shaft x, and serves to about counterbalance the weight of the shield K, in order that very little power is necessary to attract the armature and release the pin from the escape-wheel. To the rear side of the shield K, I affix a rib, L, and to one side of this rib I affix two series, a^5, of horizontal pins, b^2 b^2, &c., which extend laterally from the rib, the two rows of pins being placed a short distance apart, and the pins of each row being equidistant from one another, while the disposition of the entire number is such that each pin of one series is equidistant between the two opposite pins of the other series, the rib and pins thus arranged constituting, practically, an escape-wheel, which is governed by a pallet, making part of the armature of the magnet. This armature is composed of an upright bar, b^4, pivoted at bottom to a horizontal fulcrum, c^3, extending toward the shield from a lateral shelf or extension, d^2, of the standard E′, a horizontal bar or plate, e^2, being attached to or making part of the bar b^4, and being disposed opposite the ends of an electro-magnet, L′, which is disposed in rear of the shield K and supported by the frame D. The upper extremity of the armature-bar b^4 terminates in a lateral horizontal spur or pallet, g^4, which intercepts some one of the pins b^2 of the escape-wheel, the fulcrum of the armature being preferably so disposed with respect to the two series of pins that the pallet

shall naturally stand between them, the extent of movement of the armature in one direction being estopped by the magnet, which attracts it, and in the other direction by a suitable stop, against which it abuts by its own gravity.

One wire or electric pole, v^2, of the magnet L′ connects with the battery-wire J, and the other, y', returns to the battery.

When the shield or character-card K stands at its highest position the lowermost pin of the series rests upon the top of the pallet g^4, and the lowermost character upon the face of the shield is above the window C, and not visible through it.

The operation of the above-described arrangement of parts is as follows, it being supposed that the shield K is at its highest point, as stated, the armature away from and unattracted by the magnet, and the electric circuit with the battery open: A guest desiring to call for anything—a waiter, for instance—presses upon the knob in his room according to the card of instructions placed beside such knob, and by so doing closes the circuit with the battery-wire through the electric wire v and coil or magnet G, with which the knob is connected, the effect of which is that the magnet-poles d^1 and e^1 of the magnet G attract the adjacent armature a, and lower the same and its character-card a^1 until arrested by the pin or stud a^3, as before stated.

The electric current, after operating the display-card a^1, as stated, follows the pole u of the magnet G and intercepts and follows the battery-wire J, and from the latter follows the pole v^2 of the magnet L′, and establishes communication with the latter, the result of which is that the armature b^4 is attracted, and the pallet g^4 is removed from below the pin b^2, which rests upon it, the pallet then moving inward below the next succeeding pin in the opposite series, where it remains until, by the pressure of the knob, or otherwise, the circuit is opened, when the pallet returns to its original position and allows the shield or sign K to drop such a distance as to bring the word "Waiter" in view through the window C, and thus indicate to the attendant in the office the want of the guest.

If the article or object which is second in order upon the shield K is wanted, the guest presses the knob twice, which causes a second pulsation of the armature b^4, and repeats the closing and breaking of the circuit and lowers the second character upon the shield into view through the window, and so on throughout the entire series.

In the operation of annunciators which I have introduced under the method shown in my Letters Patent before named, I have met with considerable annoyance and objection from the fact that the guest does not continue the pressure upon the knob sufficiently long, in many instances, to establish communication with the bell or signal, which is operated by the closing of the circuit.

To obviate or overcome this objection I proceed as follows: Upon a tubular hub or sleeve, a^4, which encompasses the shaft g, independently of the sleeve of the shield K, I mount an oval disk, a^3, of wood, or other suitable non-conducting material, and I let into each longest side of the periphery of such disk a^3 a bar, b^3, of German silver, or other good conductor of electricity, the disk a^3, when the electric circuit is open, standing with its longest plane or axis in a vertical plane.

Upon the rear side of the shelf B, and in rear of the disk a^3, I erect a flexible bar or finger, c^3, whose upper end is closely adjacent to, but not touching, the said disk, this finger being composed of a good conducting material, and connected with the battery-wire J by a wire, d^3.

Upon the front of the shelf B, and in front of the disk a^3, I erect a similar finger, e^3, whose disposition with respect to such disk is the same; and I connect with this second finger, e^3, a wire, f^3, which connects with the electric bell or signal which gives notice to the attendant that a call is being made by a guest.

Upon the top of the tubular hub or sleeve a^4 I place a closed box, g^3, composed of wood or a suitable non-conducting material, and I connect the interior of this box with the conductors b^3 b^3 by two wires, h^3 i^3, one end of each wire passing through the bottom of the box and protruding a short distance into its interior. Furthermore, I place within the box a sloping or inclined partition, o^3, which is joined to the bottom of the box and rises as it recedes, and I create in the bottom of this partition, at its point of junction with the said bottom of the box, one or more holes, j^3, &c. I then place within the box a quantity of quicksilver, varying in quantity with the length of time it is desired to maintain the electric circuit. To the sleeve a^4 I attach one end of a horizontal arm, k^3, the opposite or remote end of such arm being upheld by the armature b^4 when the electric circuit is open.

When the armature is attracted by the closing of the circuit by the pressure of the knob by a guest and the shield K drops, as before stated, the outer and heavier end of the box g^3 drops by its own gravity, and the sleeve a^4 is turned upon the shaft q to such an extent as to bring the conductors or circuit-closers b^3 b^3 into contact with the fingers c^3 e^3, while at the same time the mercury which is in contact with the opposite end of such wires serves to establish communication between them, and maintains this communication until said mercury passes from contact with such wires, which it does by escaping through the hole j^3.

When the box g^3 falls, as before stated, the circuit is closed between the wire and the bell by the wire f^3, through the intervening agency of the fingers c^3 and e^3, conductors or circuit-closers b^3, wires h^3 and i^3, and mercury; and it therefore results that, so long as the mercury is retained in contact with the said wires h^3 i^3, the communication with the bell is

maintained, regardless of the length of time in which the knobs are pressed by the guest.

After the call of a guest has received proper attention the crank t is turned rearward, and the shield K, box g^3, and fallen armature a restored to place, the shield being returned by a pin, r^4, fixed to the shaft q, which abuts against the weighted arm M, carried by the hub of the shield, the box being returned by a pin, s^4, depending from the shaft q, which intercepts a stud, t^4, projecting laterally from the side of the arm k^3, before alluded to as attached to the sleeve a^4, upon which the box is mounted, while the fallen armature a is returned by the adjacent pin or stud g of the shipper-bar I, the necessary end movement of such shipper-bar to effect this result being obtained by a partial turning of the crank m, which wipes against the head a^5, to which all the shipper-bars are attached, the turning of the crank t being transmitted to the crank m by the intervening mechanism, composed of the cranks p and n, pitman o, and rock-shaft l, united and operating as stated.

The box g^3, when in an inactive position, as shown in the drawings, rests at its rear end upon a coiled spring, w^4, which is affixed to the top of a post, w^4, erected upon the shelf B in rear of the shaft q, the purpose of this spring being to maintain the arm k^3 in contact with the pallet of the armature b^4, and to relieve the box and adjacent parts from the thrust and strain to which they might otherwise be subject by the hasty turning of the crank t in restoring the box to its original position.

The box g^3, when in its normal position, as shown in the drawings, is inclined downward at its rear end to such an extent that the mercury within it is out of contact with the ends of the wires or poles i^3 b^3, and so that the mercury, after flowing through the hole j^3 into the front part of the box when the latter is lowered in the opposite direction by the retreat of the armature b^4, shall, when the box is returned, as before stated, flow over the shelf o^2 and return to the rear end of the box.

As I operate both the shield K and series of armatures a, as well as the bell or signal, by one battery and wire, I have found that with a one-armed magnet to each armature I experience some difficulty in providing sufficient power to attract such armature, and to obviate this objection I use a U-magnet, and locate the extremities of its poles in proximity to such armature in the manner stated.

It will be seen that the coil of each magnet G is applied to the board A in a peculiar manner—that is, one end of the spool l^3, containing such coil, is inserted tightly within a recess, m^3, in such board, while the two ends of the core which passes through the spool pass through such board.

I do not restrict myself to the use of mercury as a means of establishing communication between the wires h^3 i^3, as some mineral powders or other substances may be employed with substantially like effect.

The operation of the entire apparatus is, briefly, as follows: Upon pressure being applied to the circuit-closer or knob in the room of a guest, circuit is closed with the battery, and the electric current follows the corresponding wire v to the adjacent magnet G, the poles d^1 and e^1 of which operate the adjacent armature a, and lower its number-card into view through the respective window C³, thus giving information that a guest in the room to which the number corresponds has a demand to make.

From the magnet G the electric current departs by the battery-wire J to the wire v^2, which constitutes one of the electric poles of the magnet L L′, and by means of the coils and core of this magnet attracts the armature b^4 of the latter, and allows the shield K to drop, as before stated, and brings one of its characters into view through the window C, thus indicating what article is desired by the guest.

With the attraction of the armature b^4 of the magnet L′, as stated, the arm k^3, and with it the sleeve a^4 and box g^3, drop into, or nearly into, a vertical position, and so the mercury in the rear end of such box shall flow through the opening j^3 into the front of such box, it being understood, as before stated, that so long as a portion of the mercury remains in the rear part of the box it constitutes and maintains a communication between the poles or circuit-closers h^3 i^3.

Immediately after the attraction of the armature b^4 and descent of the shield K and box g^3, the electric current follows the wire d^3 to the finger c^3, and from the said finger enters the adjacent circuit-closer b^3, and from that follows the wire i^3 to the interior of said box, whereby, by means of the mercury, communication is established with the opposite wire, h^3, and the electric current follows the latter wire, and, by means of the adjacent circuit-closer b^3, intercepts and follows the finger c^3 to the wire f^3, which communicates with the bell or signal, such bell continuing to ring so long as the mercury remains in contact with the wires h^3 and i^3.

The bell gives notice to the attendant that some call is to be attended to, the nature of which and the room from which it proceeds being ascertained by referring to the windows C and C³. After attending to the call the attendant lowers the crank t and restores the shield K, armature a, and mercury-box g^3 to their original positions, as before stated.

It is hardly necessary to observe that the lowering of the shield K and armature a, with its number-card a^1, as well as the ringing of the bell, are effected almost simultaneously, so that the word upon the shield and the number upon the card appear together in view through their respective windows.

I claim—

1. The combination, in an electric circuit, of a number-annunciator provided with a series of numbers indicating different rooms, each capable of being operated or exposed independently of the others, with a single want

annunciator common to all the numbers, substantially as set forth.

2. The combination, in an electric circuit, of a want-annunciator, a number-annunciator, whether composed of one or more numbers, and mechanism serving to return at once both number and want indicators to their original or normal positions, substantially as set forth.

3. The combination, in an electric circuit, with a number-annunciator composed of a series of number-indicators, each capable of being operated or exposed independently of the others, of a single want-annunciator and a single bell or signal common to all the number-indicators, the combination being and operating substantially as set forth.

4. The combination, in an electro-magnetic annunciator, with a series of independently-operating number-indicators and a want-indicator, of a bell or signal and means whereby upon descent or movement of the want-indicator the electric circuit shall be closed with the bell or signal, substantially as set forth.

5. The circuit-closing mechanism, substantially as shown, in the disk a^3, conductors b^3, fingers c^3 e^3, and poles or wires d^3 f^3, the same being connected with the battery-wire, and operating with the rocking box g^3 and wires h^3 i^3, or their equivalents, to produce results substantially as and for purposes stated.

6. The combination, with the character shield or sign and the bell or signal which gives notice of the call of a guest, of a device for maintaining the continuity of the circuit which is closed by the descent of such shield, substantially as shown in the box g^3, with the mercury contained in it, and the wires h^3 and i^3, with the disk a^3, conductors b^3 b^3, fingers c^3 e^3, and poles or wires d^3 f^3, essentially as and for purposes stated.

7. The rocking box g^3, containing a quantity of quicksilver or other available conductor, and provided with the perforated partition o^3, or other means of retarding the flow of the conducting agent, such box being combined with the character shield or sign in such manner as to rock or tilt simultaneously with the first descent of such shield, essentially as and for purposes stated.

8. The combination of the box g^3, containing a suitable conducting material, with the disk a^3, conductors b^3 b^3, fingers c^3 e^3, and wires d^3 and f^3, and the battery-wire J, whereby circuit is closed with the bell or signal, essentially as and for purposes stated.

9. The combination of the magnet G with the armature a, substantially as herein shown—that is, with the termini of the core of such magnet disposed at different distances from the armature, and both acting upon the latter with equal or varying degrees of power, but at different times, substantially as and for purposes stated.

10. The means, substantially as herein shown, whereby, by one movement of a crank or its equivalent, the armatures a and b^4 and shield K are returned to their normal positions and the circuit between the bell or signal broken, essentially as and for purposes stated.

11. As a mechanical means of effecting the return of the armatures a b^4 and shield K to their normal positions and breaking the circuit with the bell or signal, the bars I, cranks m, p, and n, and pitman o, operating with the shaft q, substantially as and for purposes stated.

LOUIS FINGER.

Witnesses:
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