

(No Model.)

4 Sheets—Sheet 1.

W. A. HECKARD & D. OGDEN.
TELEPHONE CALL REGISTER.

No. 577,920.

Patented Mar. 2, 1897.

Fig. 1.

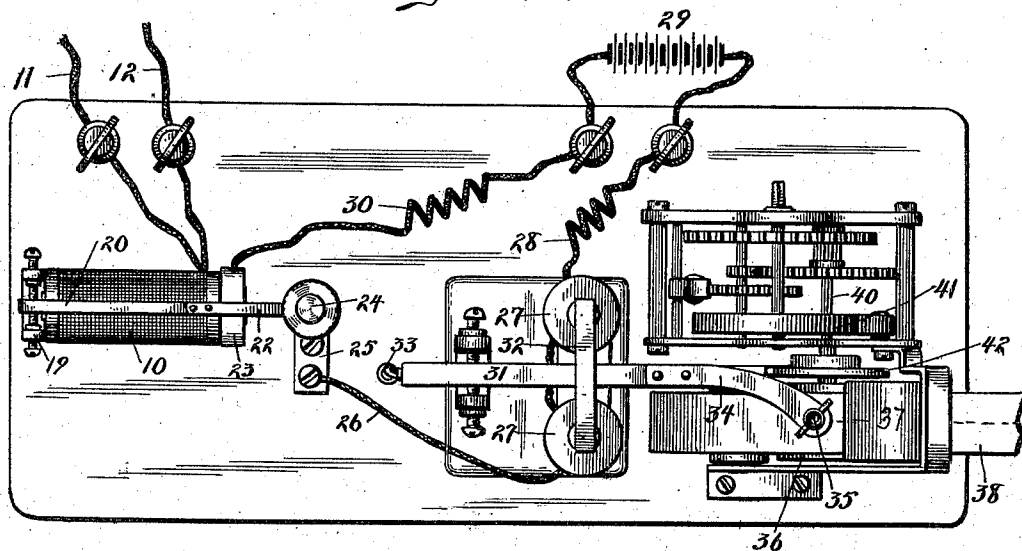
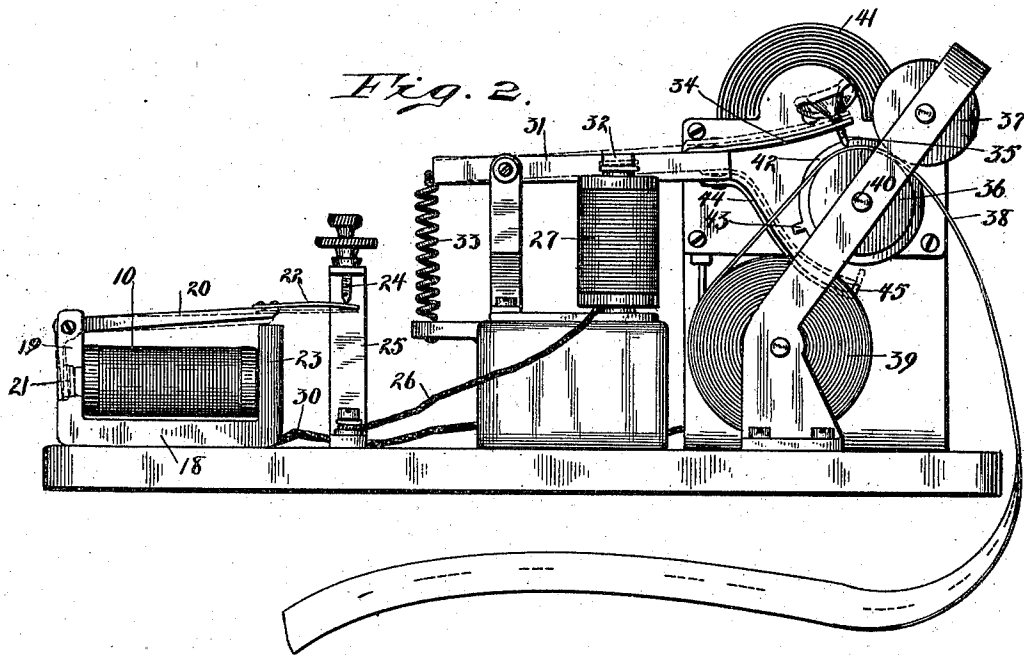


Fig. 2.



WITNESSES:

J. S. Neely
M. Austenmiller

INVENTORS

William A. Heckard
Dora Ogden

BY

H. T. Hood & Co.

ATTORNEYS

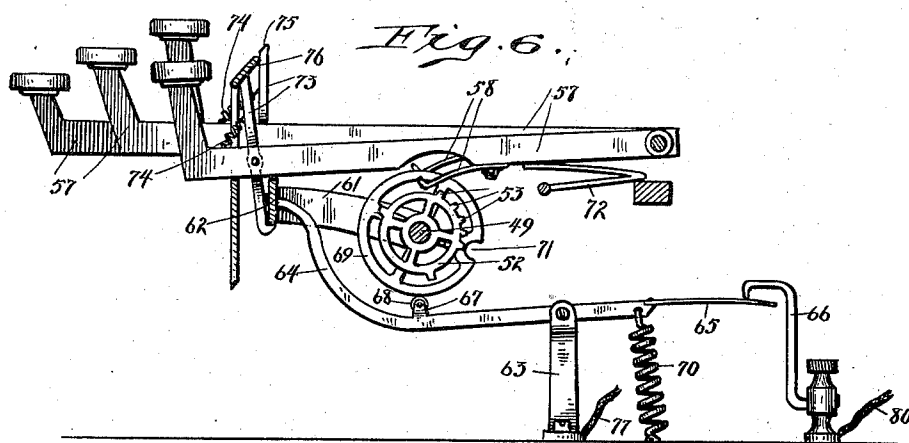
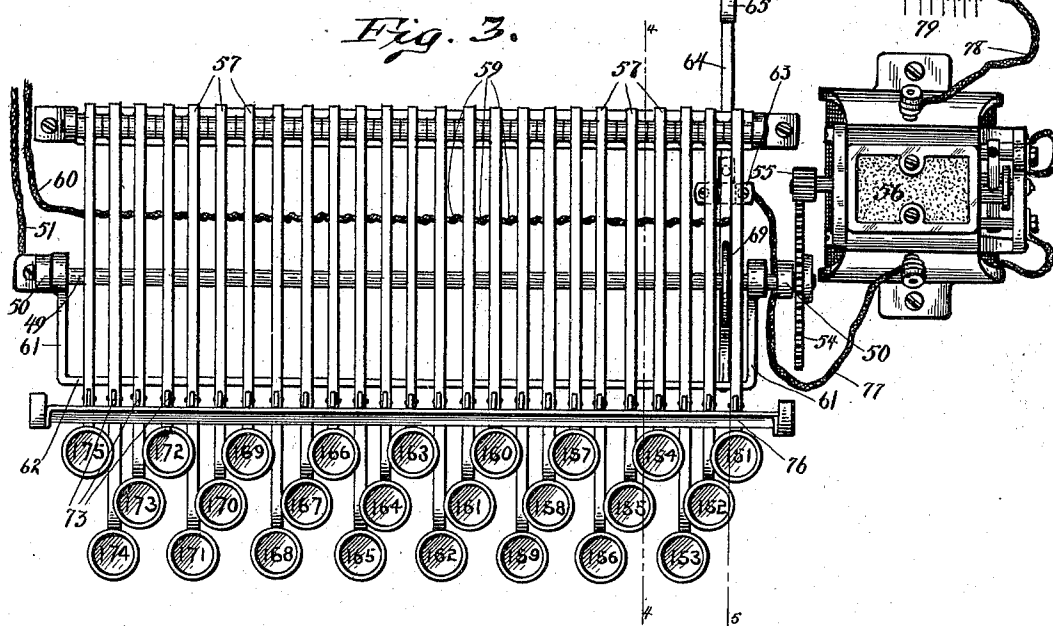
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WITNESSES:

H. B. Neely.

M. Rustenmiller

INVENTORS

William A. Heckard
Dora Ogden

BY

H. T. Good & Son

ATTORNEYS

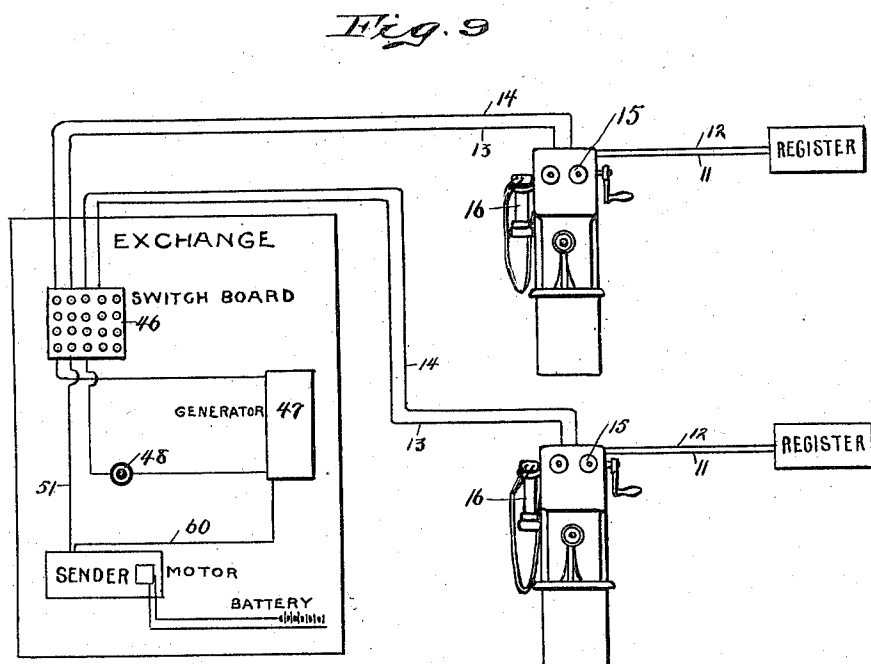
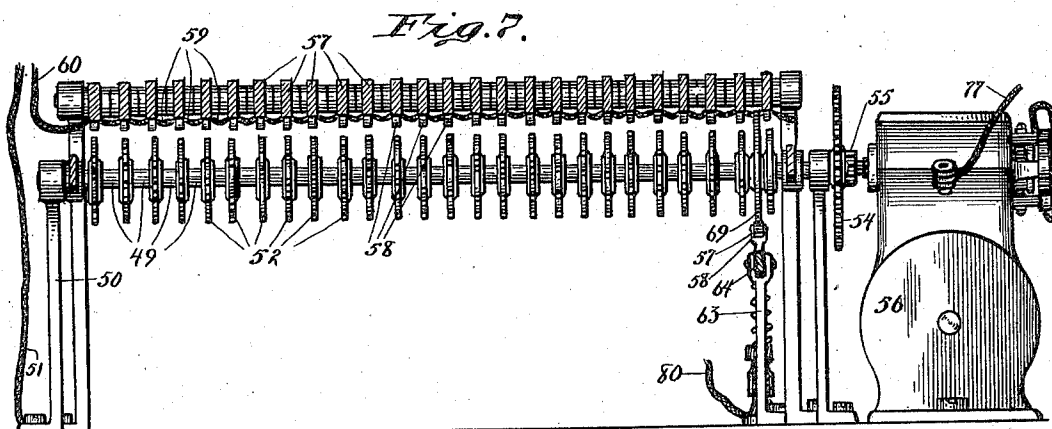
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4 Sheets—Sheet 4

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WITNESSES:

J. S. Neely
M. Austerweller

INVENTORS

William A. Heckard &
Dora Ogden

BY

H. T. Hood & Son

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM A. HECKARD AND DORA OGDEN, OF COLUMBUS, INDIANA.

TELEPHONE-CALL REGISTER.

SPECIFICATION forming part of Letters Patent No. 577,920, dated March 2, 1897.

Application filed June 8, 1896. Serial No. 594,634. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. HECKARD and DORA OGDEN, citizens of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Telephone-Call Register, of which the following is a specification.

Our invention relates to an improved telephone-call register.

The object of our invention is to produce a device which will, when properly operated by the attendant at a telephone-exchange, record in the office of a subscriber the telephone-number of any person who has called up said subscriber, and to also produce a device of the class described which will in large measure be automatic in its action.

The accompanying drawings illustrate our invention.

Figure 1 is a plan view of the register. Fig. 2 is a side elevation thereof. Fig. 3 is a plan view of the "sender," or machine for automatically operating the register. Fig. 4 is a section on line 4 4 of Fig. 3. Fig. 5 is a section on line 5 5 of Fig. 3. Fig. 6 is a section combining the parts shown in Figs. 4 and 5, showing said parts in their operating positions. Fig. 7 is a section on line 6 6 of Figs. 4 and 5. Fig. 8 is a detail. Fig. 9 is a diagram showing the electrical connections and the general arrangement of the various parts of our invention.

In the drawings, 10 indicates an electromagnet, preferably one of high resistance, adapted to receive an alternating current, the ends 11 and 12 of the coils of which are connected to the conductors 13 and 14 of the main or telephone circuit. In the ordinary telephone the main wires are connected to the bells 15 by a cut-out in such a manner that, when the receiver 16 is removed from its hook, the bells will be cut out of the telephone-circuit. In practice the wires 11 and 12 are also connected to the bell cut-out, so that the register will also be cut out of the telephone-circuit when the receiver is removed from its hook.

Magnet 10 is preferably mounted upon a metal U-shaped base 18, at the upper end of arm 19 of which is pivoted a lever 20, one end of which carries an armature 21 and the other

end of which is provided with a light projecting spring 22. Lever 20 is preferably formed with its armature-carrying arm at substantially a right angle to the other arm, so that the said lever will, of its own weight, assume its normal position, (shown in dotted lines in Fig. 2,) the outer end of the spring-carrying arm resting upon the upper end of arm 23 of the base 18. Mounted immediately above the end of spring 22 and in the path of movement thereof is a terminal 24, which is adjustably supported by a standard 25. To standard 25 is connected one end of a conductor 26, the other end of which is connected to one end of the coils of an electromagnet 27, the other end of said coils being connected by a conductor 28 with one pole of a battery 29, a conductor 30 connecting the other pole of said battery with lever 20 through base 18.

Pivoted above magnet 27 is a lever 31, provided with an armature 32, which is adapted to be acted upon by magnet 27, said lever 31 being held in its normal position (shown in dotted lines in Fig. 2) by means of a spring 33. Upon the outer or free end of lever 31 is secured a spring 34, which carries at its outer end a pen or other suitable marking or recording instrument 35. Mounted below pen 35 and in the path of movement thereof is a drum 36, over which and between said drum and a friction-wheel 37 is passed a paper strip or receiving-tape 38 from the storing-cylinder 39. Drum 36 is secured to a shaft 40, which is rotated by any suitable means, the means shown in the drawings being a system of gears driven by means of a spring 41. In order to control the rotation of drum 36 and thereby the movement of tape 38, shaft 40 is provided with a flange 42, having a pin 43 projecting from its periphery. Secured to the pen end of lever 34 is a projecting arm 44, the outer end of which is upturned at 45, the said upturned end resting upon the periphery of flange 42 and being held normally against said flange by means of spring 33. With the parts in their normal position pin 43 of flange 42 is in engagement with the upturned end 45 of arm 44, thereby preventing the rotation of shaft 40 and drum 36.

The main wires 13 and 14, comprising the main or telephone circuit, are connected at the exchange with the usual switchboard 46,

and connected with said switchboard in the ordinary manner is an alternating-current generator 47 for supplying the proper current to sound bells 15 of the telephones, said bells being sounded by the proper manipulation of the switchboard and the usual push-button 48.

The operation of our device, so far as it has been described, is as follows: Suppose A, whose telephone-number is 151, desires to talk with B, whose telephone-number is 164, for instance. The exchange operator is notified by A, and the said operator, after properly manipulating the switchboard, presses upon button 48, thereby throwing generator 47 into the circuit with B's telephone, thus causing the bells of said telephone to sound in the usual manner. At the same time that the bells of B's telephone sound the current from generator 47 also passes through wire 11, the coil of magnet 10, and wire 12, thus energizing said magnet. When magnet 10 becomes energized, it acts upon armature 21 of lever 20, and thereby causes the other end of said lever to rise and bring spring 22 into engagement with contact 24, thereby completing a circuit from contact 24 through standard 25, conductor 26, the coils of magnet 27, conductor 28, battery 29, conductor 30, base 18, arm 19, lever 20, and spring 22. The completion of the above circuit causes magnet 27 to be energized and to act upon armature 32 of lever 31, and thereby draw the free end of said lever downward, thus bringing the lower end of pen 35 into engagement with the receiving-tape 38. The downward movement of lever 31 causes the upturned end 45 of lever 44 to be withdrawn from engagement with pin 43, thereby allowing shaft 40 to be rotated by its driving mechanism. The rotation of shaft 40 causes drum 36 to rotate, and the rotation of said drum causes a movement of tape 38 under the pen, so that said pen forms a mark upon said tape, the length of said mark depending upon the length of time of contact between spring 22 and contact 24.

In case B fails to respond to the call from the exchange the operator pushes upon button 48 in a - - - - - order, thus sending the impulses "1, 5, 1" along the line, each of said impulses causing pen 35 to come into contact with the receiving-tape, the said pen rising from engagement with the tape after each continuous ring of the bells. As soon as impulses cease to be sent along the line the end 45 of arm 44 moves up into the path of pin 43, thereby stopping the rotation of drum 36 and the movement of tape 38. The effect of an alternating current passing through the coil of an electromagnet is to cause the core of said magnet to become magnetized in one direction, then to be demagnetized, then to be magnetized in the opposite direction, then to be demagnetized, the cycle of changes occurring with considerable rapidity, depending upon the rapidity of alternations of the energizing-current. This

rapid change of the magnetization of magnet 10 causes lever 20 to flutter rapidly, thus rapidly breaking the contact between the end of said lever and contact 24, thereby causing the pen 35 to make a number of short marks upon tape 38. In order to make a reliable record upon the receiving-tape, it is desirable that the pen 35 shall be brought into contact with the tape and shall remain in contact therewith during the entire time of a continuous or non-interrupted passage of the energizing-current which operates the bells, and in order to prevent the contact being broken between the end of lever 20 and terminal 24 during such a continuous or non-interrupted passage of the current the spring 22 is mounted upon the end of the lever, as described above. With this construction, when lever 20 is moved by the action of magnet 10 spring 22 is brought into engagement with terminal 24 and is flexed thereby, as shown in full lines in Fig. 2, so that as the lever flutters during the passage of the current through the magnet the end of the spring remains in contact with terminal 24, only separating from said point when said current entirely ceases.

While the register may be successfully operated in the manner described, it has been found more convenient to provide a sender which will to a considerable extent automatically operate said register, and such a mechanism is illustrated in Figs. 3 to 8, inclusive.

A metallic shaft 49 is mounted so as to rotate in suitable bearings 50, and one end of said shaft is electrically connected with the switchboard 46 by means of one of said bearings and a conductor 51. Mounted upon said shaft is a series of contact-wheels 52, each of which is provided on its periphery with a series of contact-points 53, said points being divided into various groups, so as to indicate any desired combination of numerals or signals, as clearly shown in Figs. 4 and 6. Shaft 49 may be rotated by any suitable means, in the drawings said means consisting of a gear 54, secured to the shaft and meshing with a gear 55, secured to the shaft of a small electric motor 56.

Pivoted above each contact-wheel 52 is a key 57, each of said keys being provided upon its under side with a contact spring or terminal 58, the outer end of which is adapted, when the key is depressed, to come into the path of movement of the contact-points 53 of the wheel 52 which lies immediately beneath said key. Each contact-spring 58 is electrically connected with the springs of the adjacent keys by a short flexible conductor 59, and by means of conductor 60 the said springs are connected with the generator 47. Secured to the outer end of each key 57 is a suitable head, upon which is marked a number corresponding to the number indicated by the contact-wheel 52, which lies immediately beneath the said key.

Pivoted upon shaft 49 is a lever 61, the outer arm 62 of which lies substantially par-

allel with the said shaft and extends under all of the keys 57 in a position to be engaged thereby when the said keys are depressed. Pivoted below shaft 49 upon a standard 63 is a lever 64, the forward end of which enters a slot formed in arm 62 and the rear end of which is provided with a spring-contact 65, which is adapted to be brought into engagement with a contact 66 when the forward end of said lever 64 is depressed by arm 62. Secured to the forward part of lever 64 is a short standard 67, in the upper end of which is mounted a small roller 68, which is adapted to engage the periphery of a cam 69, secured to shaft 49, and is held in engagement with said cam by means of a spring 70, said spring tending at the same time to separate spring 65 and contact 66. Formed in the periphery of cam 69 is a notch 71, into which roller 68 may be forced by spring 70, thereby preventing the rotation of shaft 49. Each key 57 is held, normally, in such position that its spring 58 will lie out of the path of movement of the contact-points 53 by means of a spring 72, and for the purpose of retaining said spring 58 in contact with said points (in the position shown in Fig. 6) a catch 73 is pivoted to each of said keys, the lower end of each of said catches being adapted to engage with the lower edge of arm 62, being forced into engagement therewith by means of a spring 74, which is secured at one end to the upper end of the key and at the other end to the key 57. For the purpose of throwing catch 73 out of engagement with arm 62 and thereby releasing key 57 the upper end of said catch is beveled, as at 75, so that as the said catch is raised by the said lever the upper end thereof comes into engagement with a guide 76, which extends across all of the keys 57, and is thereby forced out of engagement with the arm 62. A conductor 77 extends from standard 63 to one terminal of motor 56. A conductor 78 extends from the other terminal of said motor to one terminal of a battery 79, and a conductor 80 extends from the other terminal of said battery to contact 66.

The operation of the sender is as follows: Suppose that, in the previous illustration, B fails to answer the call of the exchange. The operator presses down upon the key 57 of the sender which has upon it the number of A's telephone. The said key, as it is pressed down against the action of spring 72, comes into engagement with arm 62 of lever 61, catch 73 engaging the lower edge of said arm, and causes said arm to move downward. The downward movement of arm 62 swings lever 64 upon its pivot, thereby withdrawing roller 68 from notch 71 of cam 69 and at the same time bringing spring 65 into engagement with contact 66. The engagement of said spring and contact completes a circuit from battery 79 through conductor 80, contact 66, spring 65, lever 64, standard 63, conductor 77, motor 56, and conductor 78, the completion of said circuit causing the

motor, through gears 55 and 54, to rotate shaft 49 and contact-wheels 52 in the direction indicated by the arrow in Fig. 6, the spring 65 being held in engagement with contact 66 by means of the action of cam 69 upon roller 68. The downward movement of key 57 brings the end of spring-contact 58, which is secured thereto, into the path of movement of contact-points 53 of one of wheels 52, and as said points move under said spring and come into engagement therewith a circuit is completed from generator 47, through conductor 51, shaft 49, contact-wheel 52 and points 53, spring 58, conductors 59, conductor 60, switchboard 46, conductor 13, to the bells of the telephone, and also through conductor 11, the coil of magnet 10, conductor 12, conductor 14, switchboard 46, and back to generator 47, thereby energizing magnet 10 of the register and causing said register to operate as previously described.

It will be readily understood that any desired means may be used for completing the circuit through any one of wheels 52, and that, if desired, a single lever or key 57 may be used, said key being adapted to be moved along so as to be brought over any one of the wheels 52.

It will be seen that by the above-described construction the push-button now commonly used in an exchange may be dispensed with and the sender substituted therefor. With such an arrangement, when A calls B, as above, the exchange operator merely presses down upon key 57 which has upon it A's telephone-number, thus causing B's telephone-bells to ring and at the same time causing B's register to make a record of A's telephone-number. If B is present to answer the call, the record may be immediately destroyed; but if B is absent the record will remain until he returns.

We claim as our invention—

1. In a sender for a telephone-call register, a shaft forming part of an open electric circuit, a series of contact-wheels secured to said shaft, each of said contact-wheels being provided with a series of contact-points, a terminal also forming a part of said open circuit, means for causing said terminal to engage with the series of contact-points upon any one of said contact-wheels, an electric motor connected with said shaft, a terminal forming a part of the open motor-circuit, a lever also forming a part of said motor-circuit, means operated by the movement of said first-mentioned terminal for causing said lever to engage said last-mentioned terminal and thereby close the motor-circuit, a cam secured to the shaft and adapted to engage said lever, the said cam operating, during a portion of its revolution, to hold said motor-circuit closed, and also operating to open said motor-circuit, as and for the purpose set forth.

2. In a sender for a telephone-call register, a shaft forming a part of an open electric circuit, a series of contact-wheels secured to said

shaft, each of said contact-wheels being provided with a series of contact-points, a series of keys pivoted one near each of said contact-wheels and each provided with a terminal adapted to be brought into the path of movement of said contact-points, all of said terminals being connected together so as to form a terminal of said open circuit, an electric motor connected with said shaft, a terminal forming a part of the open motor-circuit, a lever also forming a part of said motor-circuit, means operated by the movement of any one of the keys for causing said lever to engage said last-mentioned terminal and thereby close the motor-circuit, a cam secured to the shaft and adapted to engage said lever, the said cam operating, during a portion of its revolution, to hold said motor-circuit closed, and also operating to open said motor-circuit, as and for the purpose set forth.

3. In a sender for a telephone-call register, a shaft forming part of an open electric circuit, a series of contact-wheels secured to said shaft, each of said wheels being provided with a series of contact-points, a series of keys pivoted one near each of said contact-wheels and each provided with a terminal adapted to be brought into the path of movement of said contact-points, all of said terminals being connected together so as to form a terminal of said open circuit, an electric motor connected with and adapted to rotate said shaft, a terminal forming part of the open motor-circuit, a lever also forming part of said motor-circuit, an arm connected with said lever and adapted to be engaged by any one of said keys, whereby the said lever may be brought into engagement with the said last-mentioned terminal thereby closing the motor-circuit, a cam secured to the shaft and adapted to engage said lever, the said cam operating, during a portion of its revolution, to hold said motor-circuit closed, and also operating to open said motor-circuit, as and for the purpose set forth.

4. In a sender for a telephone-call register, a shaft forming part of an electric circuit, a series of contact-wheels secured to said shaft, each of said wheels being provided with a series of contact-points, a series of keys pivoted one near each of said contact-wheels and each provided with a terminal adapted to be brought into the path of movement of said

contact-points, all of said terminals being connected together so as to form a terminal of said open circuit, an electric motor connected with and adapted to rotate said shaft, a terminal forming part of the open motor-circuit, a lever also forming part of said motor-circuit, an arm connected with said lever and adapted to be engaged by any one of said keys, whereby the said lever may be brought into engagement with the said last-mentioned terminal thereby closing the motor-circuit, a cam secured to the shaft and adapted to engage said lever, the said cam operating, during a portion of its revolution, to hold said motor-circuit closed, and also operating to open said motor-circuit, a catch pivoted to each of said keys, each of said catches being adapted to engage the arm connected with said lever and thereby hold the terminal of said key in the path of movement of said contact-points, and a guide placed in the path of movement of said catches and adapted to release said catches from said arm when the said cam operates to break the motor-circuit, all combined and arranged to cooperate substantially as and for the purpose set forth.

5. In a sender for a telephone-call register, a shaft forming part of an electric circuit, a series of contact-wheels secured to said shaft, each of said wheels being provided with a series of contact-points, a series of keys pivoted one near each of said contact-wheels and each provided with a terminal adapted to be brought into the path of movement of said contact-points, all of said terminals being connected together so as to form a terminal of said circuit, means for rotating said shaft, a catch pivoted to each of said keys, an arm adapted to be engaged by any one of said catches and thereby hold the terminals in engagement with the contact-wheels, a cam mounted on the shaft and adapted to operate said arm, and a guide placed in the path of movement of said catches and adapted to release said catches from said arm when said cam moves said arm, all combined and arranged to cooperate substantially as and for the purpose set forth.

WILLIAM A. HECKARD.
DORA OGDEN.

Witnesses:

E. H. KEEL,
R. E. CONN.