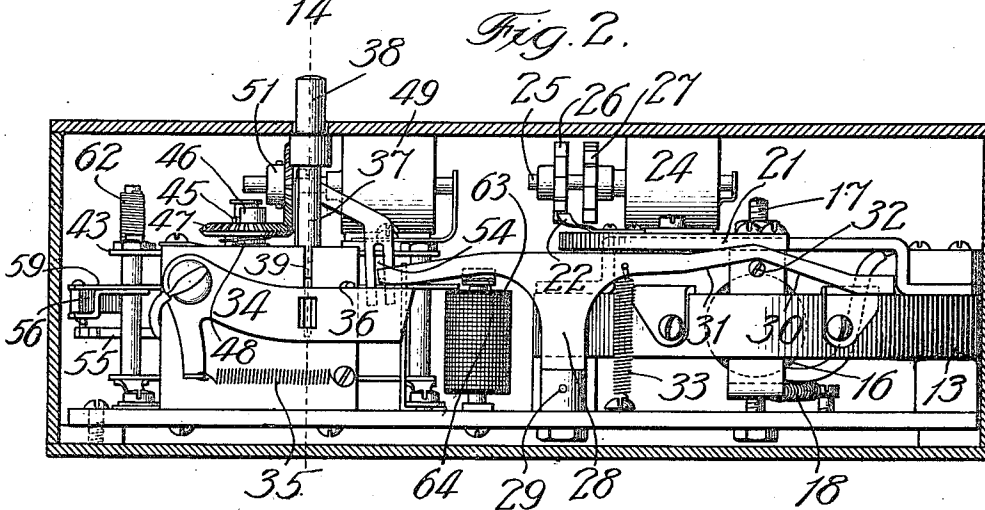
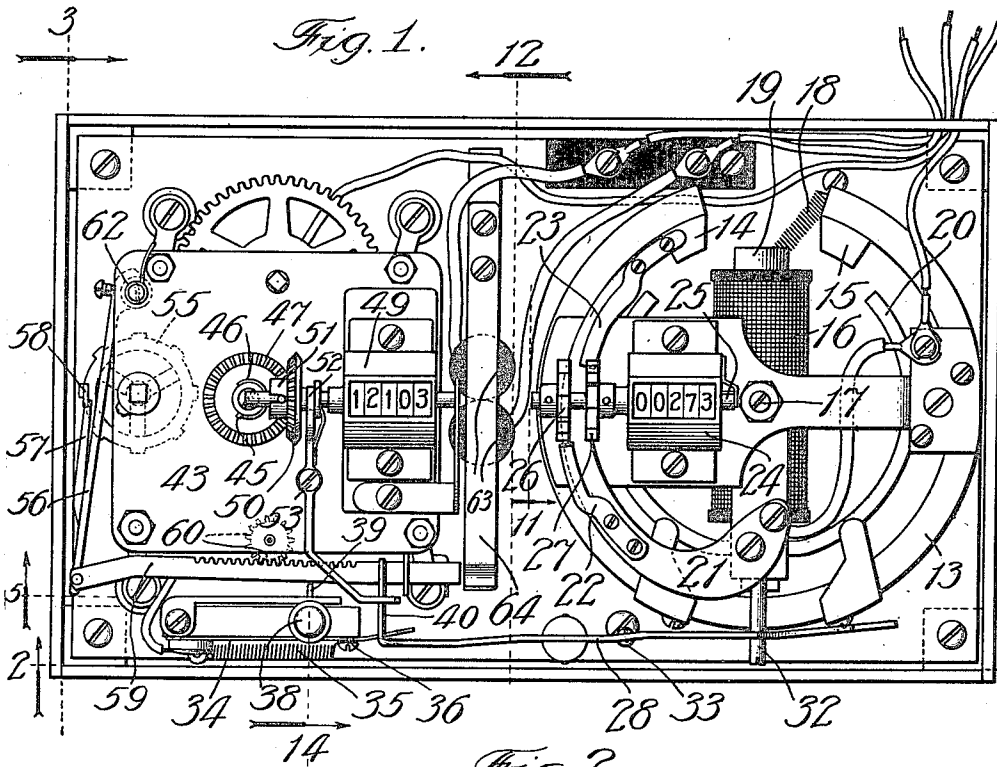


H. K. SANDELL.
TELEPHONE CALL RECORDER.
APPLICATION FILED MAR. 22, 1911.

1,064,998.

Patented June 17, 1913.

4 SHEETS—SHEET 1.



Witnesses:

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4 SHEETS—SHEET 2.

Fig. 3.

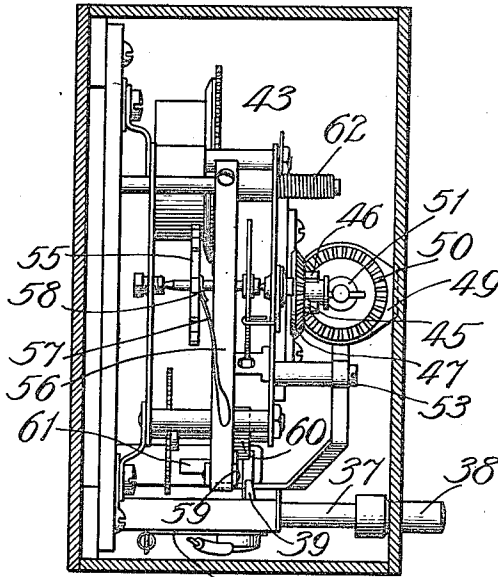


Fig. 4.

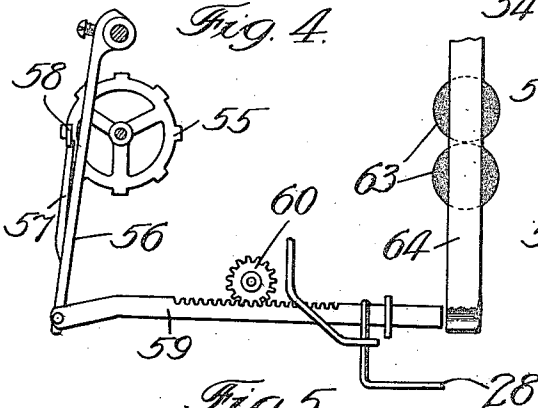


Fig. 6.

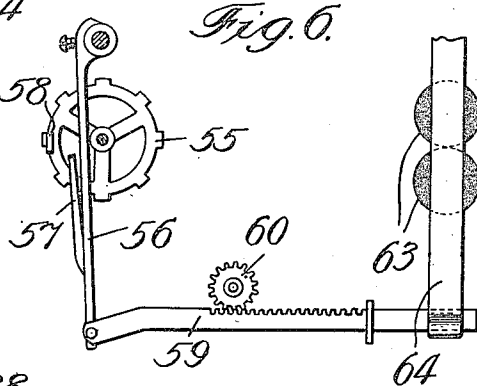


Fig. 5.

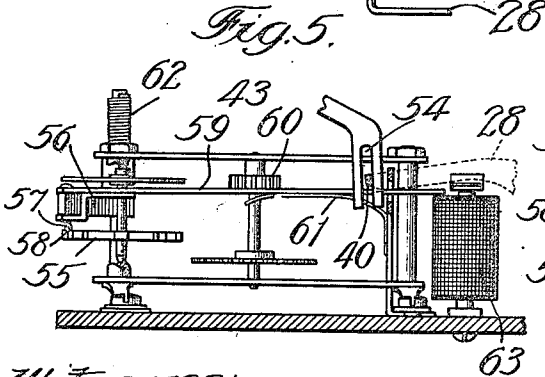
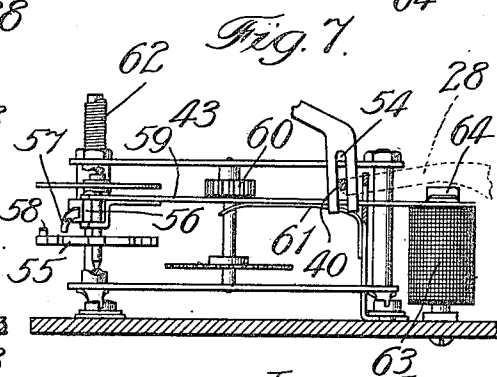


Fig. 7.



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4 SHEETS-SHEET 3.

Fig. 8.

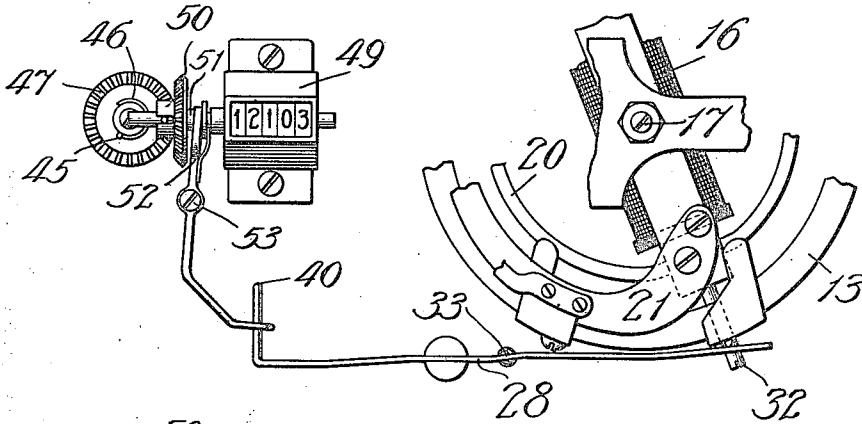


Fig. 9.

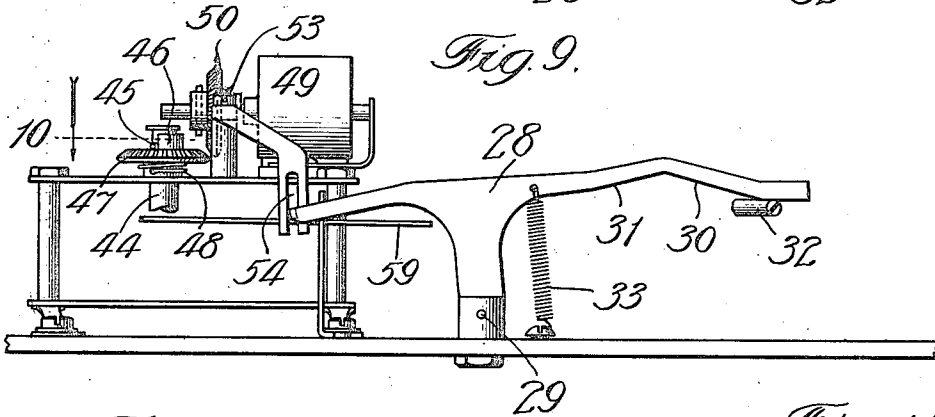


Fig. 10.

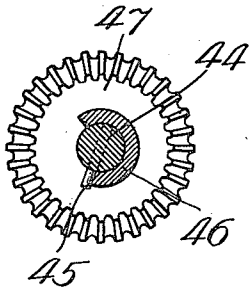
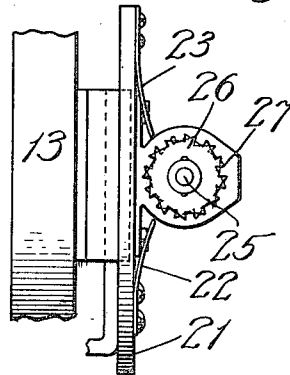


Fig. 11.



Witnesses:

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1,064,998.

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4 SHEETS—SHEET 4.

Fig. 12.

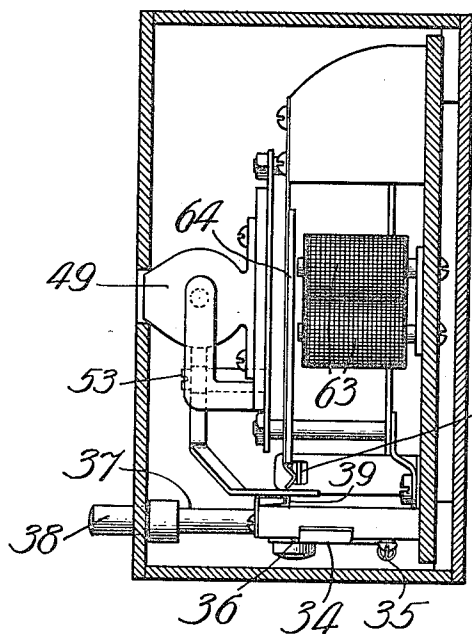


Fig. 13.

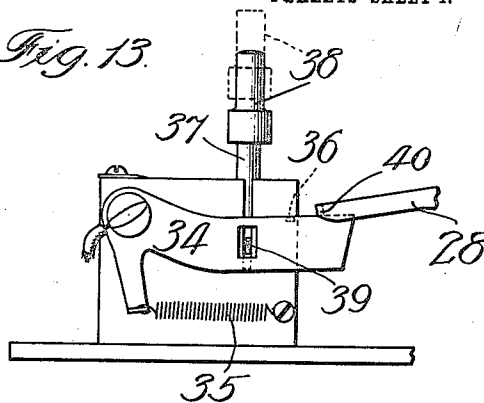


Fig. 14.

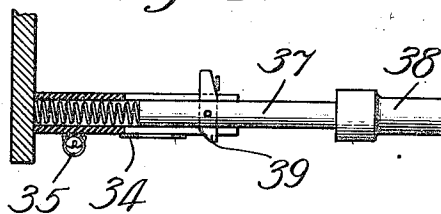
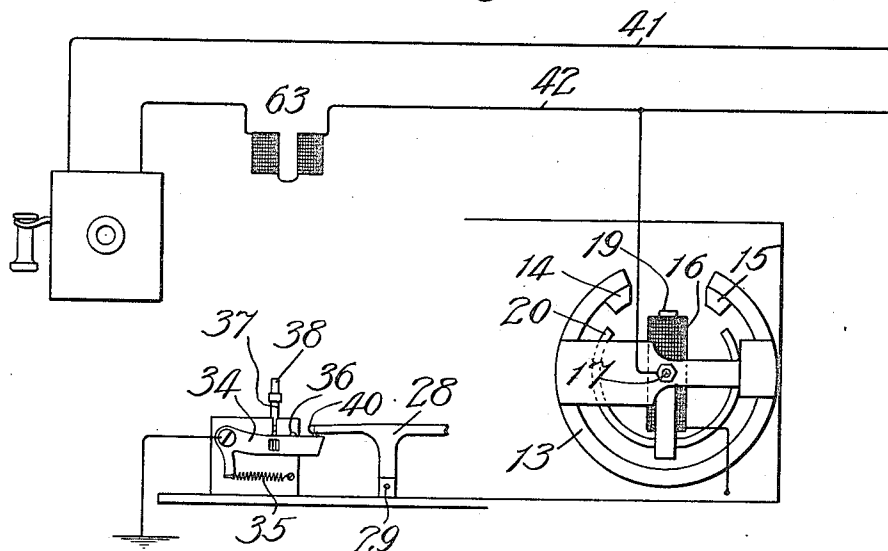


Fig. 15.



Witnesses:

Ed. Payson
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Inventor:

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By D. Greenfield, Luc. Chittin & Miller
Attys.

UNITED STATES PATENT OFFICE.

HENRY K. SANDELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

TELEPHONE-CALL RECORDER.

1,064,998.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed March 22, 1911. Serial No. 616,166.

To all whom it may concern:

Be it known that I, HENRY K. SANDELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Telephone-Call Recorders, of which the following is a specification.

My invention relates to certain new and useful improvements in telephone call registers, and is fully described and explained in the specification and shown in the accompanying drawings, in which:

Figure 1 is a front elevation of my improved device with the front of the case removed; Fig. 2 is a horizontal section on the line 2 of Fig. 1 looking upward, that is, a bottom plan of the working mechanism; Fig. 3 is a vertical transverse section on the line 3 of Fig. 1, that is, a left-hand view of the mechanism; Fig. 4 is a front view of the parts constituting the clock-stopping and starting mechanism in a position occupied when the clock is stopped; Fig. 5 is a bottom plan of the same parts; Figs. 6 and 7 are views similar to 4 and 5, respectively, but showing the corresponding parts in the position occupied when the clock is running; Fig. 8 is a front elevation of the parts constituting the overtime-registering mechanism in the position occupied when a call is being registered and the overtime mechanism being set back to normal position; Fig. 9 is a bottom plan of the parts shown in Fig. 8; Fig. 10 is a section on the line 10 of Fig. 9; Fig. 11 is a vertical transverse section on the line 11 of Fig. 1; Fig. 12 is a vertical transverse section on the line 12 of Fig. 1; Fig. 13 is a bottom plan of the contact mechanism in the position it occupies when the button is pushed; Fig. 14 is a vertical transverse section on the line 14 of Figs. 1 and 2, and Fig. 15 is a diagrammatic view of the entire circuit.

Referring to the drawings, 13 is a stationary permanent magnet in the form preferably of the arc of a circle with its poles 14 and 15 slightly separated. 16 is an electromagnet pivoted at 17 and normally held, by means of a spring 18, so that one of its poles 19 normally lies medially between the poles 14 and 15 of the permanent magnet. The opposite end of the electromagnet 16 carries a curved pole piece 20, the ends of

which extend up into proximity to the poles 14 and 15 of the permanent magnet. The result of this construction is that when current is passed through the electromagnet in either direction its pole 19 will become of one polarity and the two ends of the pole piece 20 will be of opposite polarity, with the result that the electromagnet will be powerfully swung in one direction or the other depending upon the direction in which it is traversed by electric current. The electromagnet 16 carries an arc-shaped arm 21, preferably of non-magnetic material, which overlies one side of the permanent magnet 13 and carries two spring pawls 22 and 23, the free ends of which face toward each other, and which lie in staggered radial planes (Figs. 1 and 11).

24 is an ordinary numerical register, which may be of the Veeder or other common type, provided with the usual carrying mechanism, from one end of which extends a shaft 25 carrying two ratchets 26 and 27, each of which face in opposite directions and lie in planes to be engaged by the spring pawls 22 and 23, respectively. The result of this construction is such that if a current traverses the electromagnet 16 in one direction, the magnet and its arm 21 will swing in one direction from the normal position shown in Fig. 1, thus causing one of the spring pawls 22 or 23 to engage with its corresponding ratchet and turn the register in one direction. If a current traverses the electromagnet in the opposite direction, an opposite swing will occur and the register will be turned in the opposite direction, it being understood that the movements are such that as each advances they register one digit. In the construction here illustrated the armature swings counter-clockwise to advance the register and clockwise to turn it back. 28 (Figs. 2 and 9) is a T-shaped lever pivoted at 29, having its head much longer than its stem. The right-hand arm of the head of this lever is bent to form cam-surfaces 30 and 31 adapted to be engaged by a radial pin 32 carried by the electromagnet 16 so that, as the electromagnet oscillates in either direction, the right-hand end of the head of the T-shaped lever 28 will be pressed forward and the opposite end will be pressed back and, inasmuch as the pivot

is well below the line of the head, the head will move bodily to the left as the right-hand end is pressed forward. The lever is held in its normal position by means of a spring 33.

34 is a contact plate of spring metal pivoted upon a support of insulating material and this contact plate has its free end normally pressed forward by means of a spring 35. Forward movement of the contact plate 34 is normally prevented by means of a pin 36.

37 is a push rod operated by a button 38 projecting from the front of the case, having projecting downward from it a cam 39 which is adapted to engage the contact plate 34 (Figs. 2, 13 and 14) to lift the free end of said contact plate free of the pin 36 so that the spring 35 will move said end forward. The cam 39 is pivoted on the push rod 37 to the end that the push rod may be retracted without again bending the contact plate. When the push rod is moved forward under the influence of the button 38 and the contact plate 34 consequently moves forward from the position shown in Fig. 2 to that shown in Fig. 13, its free end strikes an upwardly-turned tip 40 on the left-hand end of the T-shaped lever 28.

This completes a description of the construction of the call register proper, that is, the mechanism which will simply register the number of calls without reference to the overtime, and the general mode of operation of these parts will be set forth before proceeding to the description of the purpose, construction and operation of the overtime register portion of the mechanism.

Referring to Figs. 15, 41 and 42 are the line-wires to one of which one end of the electromagnet 16 is connected, the other end of the electromagnet being connected to its core and thence to the metallic frame of the construction, whereby the tip 40 on the T-shaped lever 28 becomes a part of the electrical circuit. The contact plate 34 is grounded, so that if the central operator connects the line-wire 42 with a generator, or other source of electrical current, the opposite pole of which is grounded the current will flow through the electromagnet, the frame of the machine, the lever 28 and its tip 40, the contact plate 34 to the ground, thus affecting the register, as already set forth. This statement, of course, assumes that the contact plate 34 is in contact with the tip 40 of the lever 28, but this is not the normal position of the contact plate. Under normal conditions the circuit thus outlined is broken between the end of the contact plate 34 and the tip 40, and this contact is made under the following conditions.

When a subscriber makes a call he is advised by the central-operator to drop a

nickel or push a button, as the case may be, and whatever may be the form of words used by the central-operator, he will push the button 38 thereby releasing the contact plate 34 from engagement with the pin 36 and permitting it to contact with the tip 40 of the lever 28, thereby closing the break in the circuit and setting the registering mechanism in such position that the central-operator can register a call. When the called subscriber answers, central throws the switch in the proper direction and registers a call. If for any reason the called subscriber is not reached, the central-operator does nothing and no call is registered. If a call is registered by mistake the central-operator can readily retract the register by throwing in a current in the opposite direction. This would occur, for instance, if the wrong party is obtained and a call registered and the right party cannot be obtained. The movement of the lever 28, upon the swinging of the electromagnet, through the action of the pin 32 upon the cam-surfaces 31 or 30 of said lever, returns the contact plate to its normal position, so that it is held by the pin 36 and the central-operator cannot register a second call until the button is again pushed. This register mechanism can take the place of the ordinary coin-box on an ordinary telephone circuit adapted for the use of such a box. In the said circuits of a very common type, money is dropped into the box by a current in one direction between one of the line-wires and the ground and is returned to the subscriber by a current in the opposite direction, so that the present construction can be inserted in place of such boxes and will operate successfully with only the slight difference in manipulation that the central-operator will do nothing if a call is not obtained successfully, whereas, at the present time she throws in a current in the direction to return the coin.

Turning now to the overtime registering mechanism 43 is a clock-movement of which 44 is the main arbor the same projecting forward from the casing of the clock movement. This arbor carries a pin 45 running in a segmental slot in a boss 46 on a miter-gear 47. As the clock moves the arbor rotates clockwise and the miter-gear 47 is connected with said arbor by a spring 48 (Fig. 9) whereby the miter-gear is normally pressed in the same direction so that the pin 45 normally lies against the rear of the slot in the boss 46. 49 is an overtime-register upon the shaft of which is a longitudinally-movable miter-gear 50 adapted when pushed to the left, as viewed in Figs. 1, 2 and 9, to engage the miter-gear 47 but to be disengaged therefrom by a movement to the right. This miter-gear 50 has a

grooved boss 51 in which runs a fork 52, pivoted at 53 and slotted at its lower end at 54 to engage the tip 40 of the T-shaped lever 28 so that when the T-shaped lever has its right end swung forward by the oscillation of the electromagnet 16 and its left-hand end moves to the left, as viewed in Figs. 1, 2 and 9 the lower end of the fork 52 will be swung to the left and the upper end to the right, thereby disengaging the miter-gear 50 and the miter-gear 47. Upon this disengagement the spring 48 will instantly operate to return the miter-gear 47 to its normal position with reference to the pin 45 on the arbor 44 of the clock-movement, which normal position is shown in Fig. 10. The result of this construction is that when the clock is set in motion as by the mechanism hereinafter set forth, the electromagnet then being in its normal position and the miter-gears 47 and 50 being in mesh, the clock will run for a certain length of time until the pin 45 traverses the slot in the boss 46 and strikes the opposite end of the slot, whereupon it will begin to turn the miter-gear and move the overtime register. The slot is of such length that the clock will run for the proper length for one telephone call without beginning to register overtime. Under ordinary conditions the subscriber is entitled to a three minutes' conversation for the price of one call and in cities where this is the case, the slot will be made so that the clock will run three minutes and thereafter will move the overtime register forward in an obvious manner. Each time a new call is registered on the call register, the miter-gear 47 will snap back to its normal position on the arbor so that the subscriber will get each time a full three-minutes' call before the overtime will begin to register.

55 is a balance-wheel of the clock-movement and 56 is a lever pivoted adjacent thereto and carrying a spring-tooth 57 which is adapted when the lever 56 is swung to the left, as shown in Fig. 4, to engage a projection 58 on said balance-wheel 55. The lower end of the lever 56 is connected to a rack-bar 59, the pivot between the rack-bar 59 and the lever 56 permitting sufficient lost motion that the rack-bar can be moved to a certain extent in a plane transverse its length. The rack-bar 59 normally engages with a pinion 60 forming part of the clock-movement or driven thereby and the rack-bar is normally held forward or in the plane of the pinion 60 by a spring 61, but the rack-bar can be pushed backward so as to fall out of engagement with said pinion 60. The rack-bar is normally spring-pressed to the right or to the position shown in Fig. 6, by means of a spring 62 operating upon the shaft to which the lever 56 is pivoted, but the normal position of the rack-bar is that

shown in Fig. 4, where, by engagement with the pinion 60, it is held against the force of the spring 62.

63 is an electromagnet in series with the line. 64 is the armature of said magnet, the end thereof being in position, when the rack-bar is to the right, as shown in Fig. 6, and the armature 64 is depressed, to engage therewith so as to hold the rack-bar out of the plane of the pinion 60, as shown in Fig. 7. The tip 40 of the T-shaped lever 28 is carried upward over the rack-bar 59 so that each time the lever 28 oscillates on its pivot, the tip 40 will strike the rack-bar pushing the same back out of engagement with the pinion 60, whereupon the spring 62 will force it to the right under the end of the armature 64 and then, if the current is flowing through the magnet 63, the rack-bar will remain out of engagement with the pinion 60. Or, in the alternative, if the rack-bar is in a position with its end under the armature 64 and said armature is at any time depressed so as to engage with the rack-bar, a similar movement of the rack-bar to its extreme right-hand position will occur. This completes the description of the mechanism and from it the complete operation of the overtime recorder can be understood. When the subscriber picks up his receiver to make a call, the line-current commences to flow through the magnet 63 depressing the end of the armature 64, the remaining parts, however, staying in their normal positions. The clock is thus stationary through engagement of the spring-tooth 57 with the projection 58 on the balance-wheel 55 thereof. When the button is pushed the overtime mechanism is not affected but when the call is registered the movement of the lever 28 under the influence of the electromagnet 16 depresses the rack-bar throwing it back of the plane of the pinion 60 so that the spring 62 simply throws the rack-bar as far as possible to the right, that is, from the position shown in Fig. 4 to that shown in Fig. 6. As long as the line-current continues to flow, the armature 64 will hold the rack-bar in this position. Immediately on the moving of the rack-bar to the right, the spring-tooth 57 will disengage the projection 58 on the balance-wheel of the clock and the clock will start to move and will continue so to do as long as the line-current flows. When the clock has run for the requisite period determined by the length of the slot in the boss 46 of the miter-gear 47, the overtime register will begin to turn and it will continue to turn until the line-current ceases to flow. When the line-current does cease to flow, the rack-bar will promptly move into engagement with the pinion 60 and, by such engagement, will be moved to the left so that the tooth 57 will stop the clock. The parts

are so arranged that it will take eight or ten seconds for the clock to stop after the line-current has ceased to flow. This gives ample opportunity for movement of the receiver-hook to be made for the purpose of attracting the attention of the central-operator without stopping the clock. If, for instance, the line-current ceases to flow for only two or three seconds the end of the rack-bar will not have moved from beneath the armature 64 when the line-current is again passed through the magnet 63, and the rack-bar will be again pushed backward before the clock has stopped. There is thus no possibility that the subscriber can, by manipulation of his switch-hook, prevent the accurate registering of overtime. The only way that it would be possible for him to stop the registering of overtime would be for him to hang up the hook for ten seconds continuously, but it is to be expected that by the time a switch-hook has been hung up for that length of time, the central-operator will have disconnected the subscriber. Having set out this operation, it will be evident that if one is to be absolutely accurate in description that the slot in the boss of the miter gear 47 must be of such length that the clock can run the full time of the single-price call plus the time which it will take for the rack-bar to get back into position and stop the clock before overtime will be registered.

I am aware that considerable variation is possible in the details of the construction here shown and described as my preferred form and, therefore, do not wish to limit myself to such specific form by reason of having described it in detail as required by law. My intention is, on the contrary, in the following claims, to set forth all the novelty which is inherent in the construction described.

I claim as new and desire to secure by Letters Patent—

1. In combination a clock-movement, means for starting the clock at the beginning of a call, an overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement can run for a definite period before moving the overtime-register and means to stop the clock-movement a predetermined time, after each call.

2. In combination a clock-movement, means for starting the clock at the beginning of a call, an overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement can run for a definite period before moving the overtime-register, means to stop the clock-movement a predetermined time after each call, and means for setting the lost-motion connection to normal position after each call.

3. In combination a clock-movement, means for starting the clock at the beginning of each call, an overtime-register, a pinion on the overtime-register shaft, the pinion meshing therewith and connected with the clock-movement by a pin and slot connection whereby lost-motion is permitted, a spring holding said second pinion in a normal position with reference to the clock-movement, and means operated after each call for moving the first named pinion to throw the two out of mesh whereby said spring may return said second pinion to normal position.

4. In combination a clock-movement, means for starting the clock-movement at the beginning of a call, an overtime-register, a pinion movable on the overtime-register shaft, a second pinion meshing therewith and carried by the clock-movement and connected therewith by a pin and slot connection whereby lost-motion is permitted, a spring holding said second pinion in a normal position with reference to the clock-movement, and means operated after each call for moving said first pinion upon its shaft to throw it out of mesh with the second pinion, whereby the spring may return the second pinion to normal position.

5. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement can run for a definite period before moving the overtime-register and means to stop the clock-movement after each call.

6. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register advancing means for starting the clock-movement, an overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement can run for a definite period before moving the overtime-register, means to stop the clock-movement after each call, and means for setting the lost-motion connection to normal position after each call.

7. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an overtime-register, a pinion on the overtime-register shaft, a pinion meshing therewith and connected with the clock-movement by a pin and slot connection whereby lost-motion is permitted, a spring holding said second pinion in a normal position with reference to the clock-movement, and means operated

after each call for moving a pinion to throw the two out of mesh whereby said spring may return said second pinion to normal position.

5 8. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an
10 overtime-register, a pinion movable on the overtime-register shaft a second pinion meshing therewith and carried by the clock-movement and connected therewith by a pin and slot connection whereby lost-motion is
15 permitted, a spring holding said second pinion in a normal position with reference to the clock-movement, and means operated after each call for moving said first pinion upon its shaft and throw it out of mesh with
20 the second pinion, whereby the spring may return the second pinion to normal position.

9. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register,
25 means operated by the register-advancing means for starting the clock-movement, an overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement
30 can run for a definite period before moving the overtime-register, and means operated by the next operation of the call-register advancing means for setting the lost-motion connection to normal position.

35 10. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an
40 overtime-register, a lost-motion connection between the clock-movement and the overtime-register whereby the clock-movement can run for a definite period before moving the overtime-register, means to stop the
45 clock-movement after each call, and means operated by the next operation of the call-register advancing means for setting the lost-motion connection to normal position.

11. In combination a clock-movement, a
50 call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an overtime-register, a pinion on the
55 overtime-register shaft, the pinion meshing therewith and connected with the clock-movement by a pin and slot connection whereby lost-motion is permitted, a spring holding said second pinion in a normal position
60 with reference to the clock-movement, and means operated by the next operation of the call-register advancing means for moving a pinion to throw the two out of mesh whereby said spring may return said
65 second pinion to normal position.

12. In combination a clock-movement, a call-register, means controlled by the central operator for advancing the call-register, means operated by the register-advancing means for starting the clock-movement, an overtime-register, a pinion
70 movable on the overtime-register shaft, a second pinion meshing therewith and carried by the clock-movement and connected therewith by a pin and slot connection whereby lost-motion is permitted, a spring holding said second pinion in a normal position with reference to the clock-movement, and means operated by the next
75 operation of the call-register advancing means for moving said first pinion upon its shaft and throw it out of mesh with the second pinion whereby the spring may return the second pinion to normal position.

13. In combination a clock-movement, means for starting the clock-movement at the
85 beginning of a call, an overtime-register operated by the clock-movement and connected therewith by a lost-motion connection whereby the clock-movement will run a definite period without affecting the overtime-register and means operative upon the breaking of the line-circuit for stopping the clock-movement, a determined time after
90 such breaking.

14. In combination a clock-movement, means for starting the clock-movement at the
95 beginning of a call, an overtime-register operated by the clock-movement, means operative upon the breaking of the line-current for stopping the clock-movement a determined time after such breaking.

15. In combination a clock-movement, an overtime-register operated by the clock-movement, a member adapted to be moved
105 by the clock-movement and arranged when moved to normal position to stop the clock-movement, means for moving said member on the beginning of a call in position to start the clock, means operated by the line-current
110 for holding said member when so moved out of engagement with the clock-movement and arranged to permit said member to engage the clock-movement to stop the same a pre-determined time after the line-current
115 ceases.

16. In combination a clock-movement, an overtime-register operated by the clock-movement, a rack-bar adapted to be moved
120 by a clock-pinion and arranged when moved to normal position thereby to stop the clock-movement, means for moving said rack-bar on the beginning of a call into position to start the clock, a magnet affected by the line-current and an armature therefor
125 arranged to engage the rack-bar to hold the same out of engagement with its moving pinion during the passing of the line-current.

17. In combination a clock-movement, an 130

overtime-register operated by the clock-movement, a member adapted to be moved by the clock-movement and arranged when moved to a normal position to stop the movement, a call-register, call-register-operating means, means operated by said call-register-operating means for moving said member into position to start the clock, means operated by the line-current for holding the member when so moved out of engagement with the clock-movement and arranged to permit said member to engage the clock-movement to stop the same when the line-current ceases.

18. In combination a clock-movement, an overtime-register actuated by the clock-movement, a member adapted to be moved by the clock-movement and arranged when moved to normal position to stop the clock-movement by engagement therewith, a call-register, call-register-advancing means, and means operated by the call-register-operating means for moving said member into position to start the clock.

19. In combination a clock-movement, an overtime-register operated by the clock-movement, a rack-bar adapted to be moved by a clock-pinion, a part movable with the rack-bar for engaging the clock-movement to stop the same when the rack-bar is in normal position, a magnet affected by the line-current, an armature for said magnet arranged to engage the rack-bar to hold the same out of engagement with its moving pinion while the line-current is passing, a call-register, call-register-advancing means and means operated by the call-register-advancing means for moving said rack-bar into position to be engaged by said armature.

In testimony whereof I have hereunto set my hand and affixed my seal this 11th day of March, 1911.

HENRY K. SANDELL.

In the presence of two subscribing witnesses:

L. HEISLAR,
R. SCHAEFER.