W. W. ALEXANDER.

ELECTRIC SELECTOR AND SIGNALING APPARATUS.

APPLICATION FILED MAY 27, 1908.

965,793.

Patented July 26, 1910.

3 SHEETS—SHEET 1.

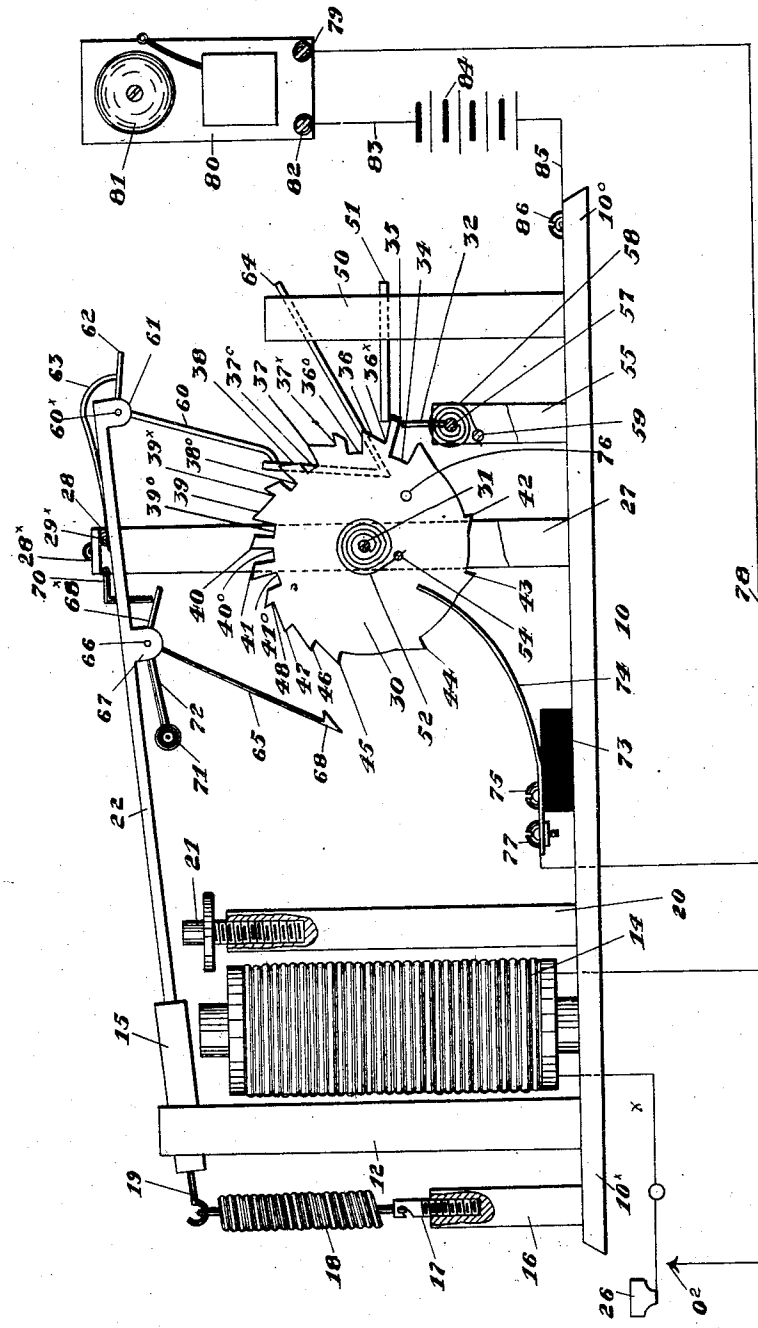

Fig. 1.

Witnesses
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3 SHEETS—SHEET 2.

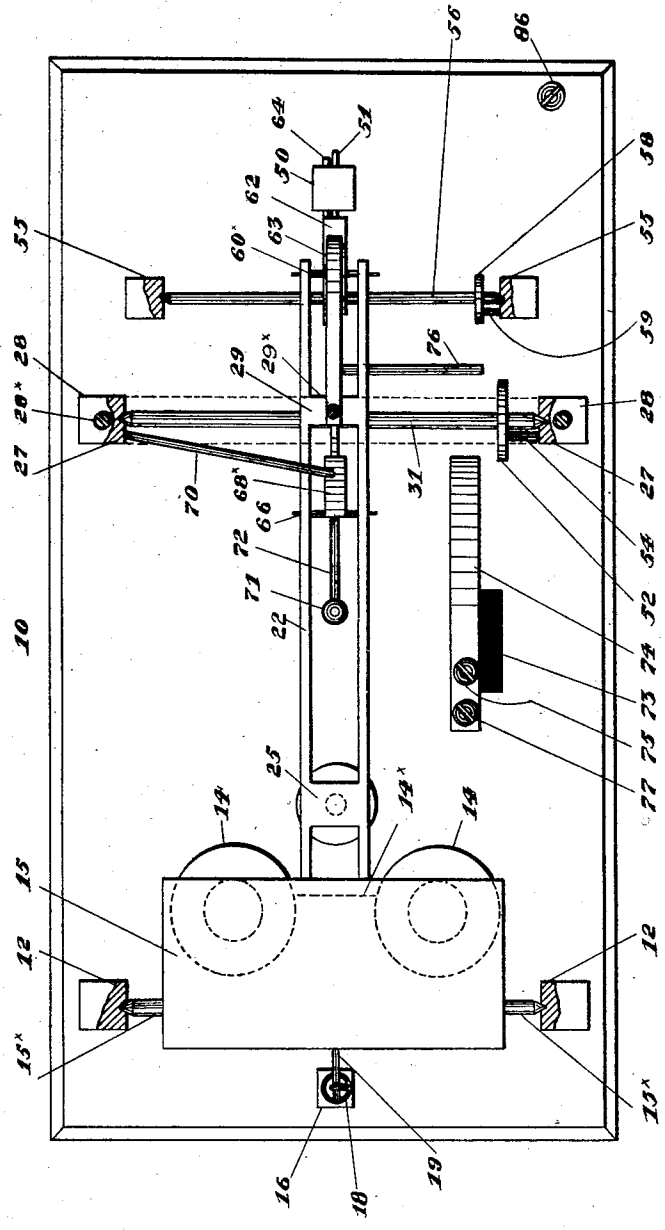

Fig. 2.

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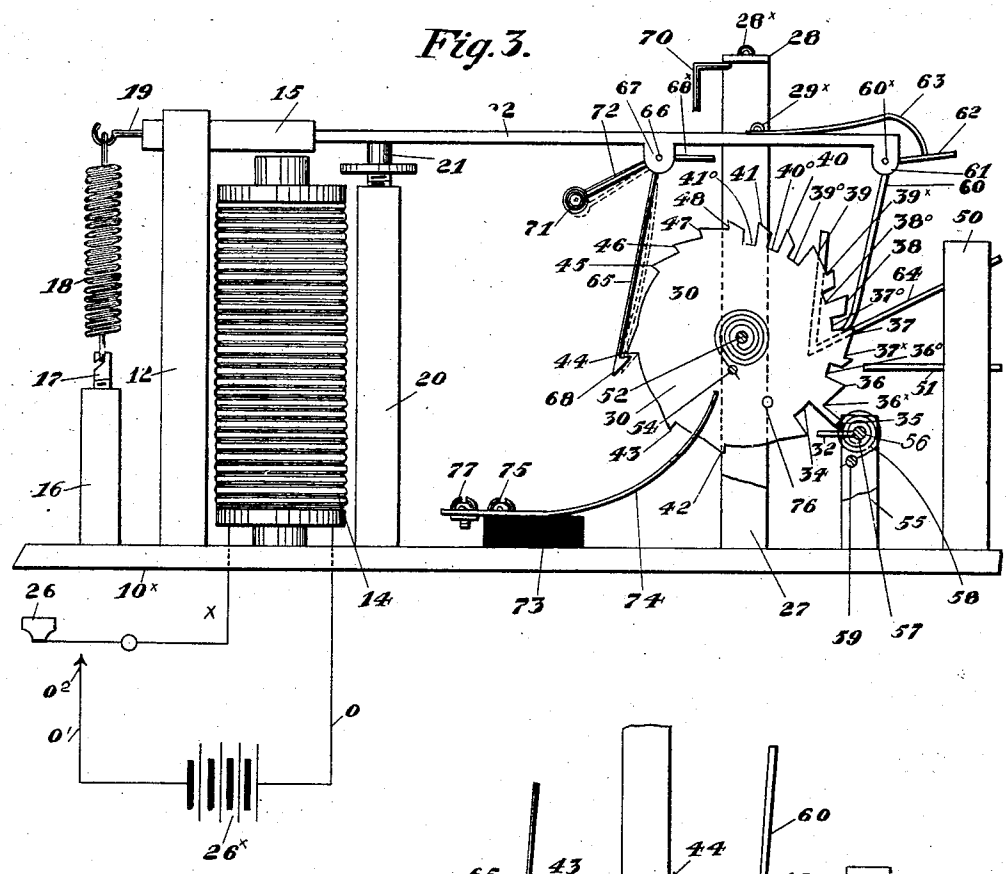
3 SHEETS—SHEET 3.

Fig. 3.



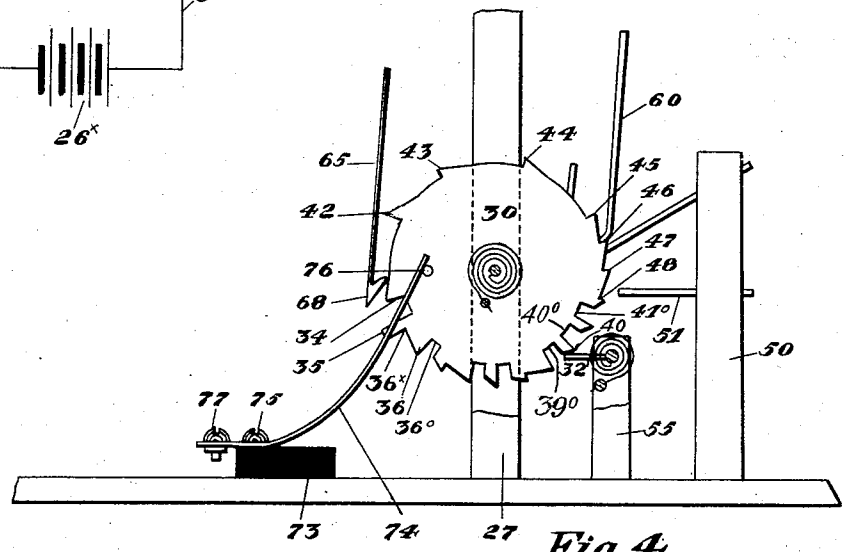


Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM W. ALEXANDER, OF KANSAS CITY, MISSOURI.

ELECTRIC SELECTOR AND SIGNALING APPARATUS.

965,793. Specification of Letters Patent. **Patented July 26, 1910.**

Application filed May 27, 1908. Serial No. 435,286.

To all whom it may concern:

Be it known that I, WILLIAM W. ALEXANDER, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Electric Selector and Signaling Apparatus.

The primary object of the invention is to enable a call or signal to be selectively made at any one of a number of offices or relays in a single electric circuit without disturbing or calling the others. Secondly, to obtain by the invention upon a telegraph or telephone line the inclusive offices of the ordinary signaling instrument or sounder with the reduction in time ordinarily consumed in making calls or signals.

The invention consists in connection with a battery circuit of an electromagnet and its armature, and a key for opening and closing the circuit and the attraction of the armature at variable times and its release a predetermined number of times to effect a mechanical movement, the construction of which is hereinafter described, to open and close electric circuits. This result is accomplished by means illustrated in the accompanying drawings, the construction and operation of which will be first fully described and the invention specifically pointed out in the claims.

Like characters of reference indicate corresponding parts in all the figures of the drawings.

In the drawings: Figure 1, is a view in elevation of the electric selector and signaling apparatus, in accordance with the invention. Fig. 2, is a plan view of the invention. Fig. 3, is a view of the invention as seen in Fig. 1, showing the armature attracted by the electro-magnets and the changed position of the operative parts. Fig. 4, is a side view of a portion of the mechanism in the signal or bell circuit, showing the portions of the cog-wheel and co-acting devices, when the call has been correctly made and the bell circuit closed.

Referring to the drawings, 10 indicates the rectangular-shaped base plate or support for the electric signaling apparatus, adjacent to one end of which base plate and directly opposite in position are the vertical standards 12, 12.

Attached to the end 10^{x}, of the base 10, a short distance from a line transverse to the base plate extending through the standards 12 and inwardly from said line are the electromagnets 14, arranged vertically in position and connected electrically at 14^{x}. These magnets in height are less than the height of the standards, and between the upper ends of the standards is the armature 15, its forward portion extending horizontally over both poles of the magnets 14, so as to be attracted and drawn downwardly by said magnets, and the side and rear portions of the armature connected pivotally by the pivots 15^{x}, to the inner surfaces and upper ends of the said standards.

Upon the portion 10^{x} of the base plate 10 outwardly from the line extending through standards 12 is a post 16, short in height, in which is an adjusting screw 17, to which is fastened one end of a retracting spring 18, the other end of which spring is fastened to a rigid lever extension 19, of the armature 15. A post 20 is secured to the base plate at a point on the base plate inwardly from the electromagnets 14, and corresponding in height in the upper end of which is the adjustable screw top 21. With the inner portion of the armature is connected an inner extension 22, comprising parallel, narrow plates of considerable length, for the purpose subsequently explained. With these plates in position above the adjustable stop 21 is rigidly secured a block 25, ordinarily employed with the stop to sound telegraphic signals by the impact of a blow of the block in its downward movement.

With the poles of the magnets 14 are connected the electric circuit wires x, o, the latter conducting wire being connected with the battery 26^{x}, in the circuit, and with the battery is connected the wire o' with an open contact point o^{2}. With the wire x is connected the ordinary telegraph key 26, which closes the circuit with the point o^{2}, of the battery circuit. It will be observable that the ordinary telegraphic message may be transmitted in the battery circuit and with the use of the Morse code the dispatch of the messages being synchronical as the pulsations are imparted to the key through the battery circuit.

Upon the central portion of the base 10,

and slightly toward the end 10° are secured rigidly the uprights or standards 27, their upper ends extending considerably above the horizontal line of the upper ends of the standards 12. With the tops of the standards 27, one of which is broken away at Fig. 1, are connected the ends of a connecting bar 28, by the screws 28×. The outer ends of the extension arms or plates 22, of the armature 15, extend beneath the connecting bar 28, and this bar it will be observed forms the stop that sounds the back click in a telegraph message, and in the present instance when the point 29×, upon the block 29, upon the said plates 22 strikes the lower surface of said bar, when the battery circuit 26× is open, and the electromagnets deënergized and the bars 22 move upwardly under the force applied by the contraction of the spring 18.

Between the standards 27 is mounted an irregular cog or escapement wheel 30, the pivots 31 of which wheel are pivoted on the inner surfaces of the standards 27. The cogs are cut at irregular spaces apart, as further described, according to the order in which the long and short intervals of time of energizing and deënergizing of the electromagnets is intended to be made, and between some of the cogs are recesses, sufficiently wide to give clearance and to prevent the selective pawl 32 from holding the wheel, the recesses giving its free end room to swing past the line joining its center with the center of the cog wheel 30, which pawl exercises, as will further appear, a mechanical selection of the recesses and imparts also a retractive impulse to the cog wheel 30.

In the present instance the position of the cogs and recesses which occupy less than one-half of the periphery of the wheel, are in the following order: In the lower, rear portion of the wheel is the large recess 34, as seen in Figs. 1 and 3. Above the recess and forming its upper side is a long cog 35, extending a short distance beyond the circular line of the ends of the other cogs. This cog is part of a long cog 36, in which is a notch 36×. Then follows a wide recess 36°, and then a double cog 37, in which is a notch 37×; then follows a wide notch 37°, then a single cog 38, following which cog is a recess 38°, and following said recess is a double cog 39, in which is a notch 39×; next follows in the direction of the circumference of the wheel a wide recess 39°, then the single cog 40, then the wide recess 40°, then single cog 41, and then the recess 41°. Now, starting from the recess 35 in the other direction of the circumference of the wheel 30, and upon the portion of the wheel approximately upon a line with the pivot 31 and the recess 41° is a tooth 42, and at a point a short distance in the line of the circumference of the wheel is a tooth 43, and at a point approximate to that between recess 32 and tooth 42 is a tooth 44, and then a tooth 45, which is approximately distant from tooth 44 as said tooth is from the tooth 43. Between the tooth 45 and the recess 41° are the teeth 46, 47 and 48 in consecutive positions.

Upon the base plate and at a point in line with and a considerable distance from wheel 30 is a fixed post 50, to which post is secured one end of a pin or stop 51, the other end of which stop extends horizontally to a position in the path of the long cog 35, avoiding the other cogs in the cog wheel, this stop being the back stop or zero point for said wheel. Upon the pivot 31 to the cog wheel 30 is a coiled spring 52, its inner end being secured to the said pivot and its outer end being secured to a stud 54 on the inner side of the adjacent standard 27. The office of this spring is to overcome the inertia of the cog wheel 30 and to cause its return so as to bring the long cog in contact with the stop 51 very quickly when a mistake has been made in sending a signal or call, as further explained.

Upon the base 10 a short distance from the standards 27 supporting the irregular cog wheel 30, and toward the end 10°, of the base, are secured the posts 55, which are less than one third the height of the posts 27. 56 indicates a long bearing or pivot, to one end of which pivot is secured fixedly one end of a coiled spring 58, the outer end of which spring is secured fixedly to a stud 59, on the inner surface of the post 55, adjacent thereto. Upon this pivot 56 is secured the selecting pawl or plate 32, before referred to, and under the control of the spring 58. This spring is so set that when not under tension it will keep the free end of the pawl 32 in repose away from and outside the circle described by all the cogs on wheel 30, except the long cog 35, and when under tension it assists to cause the movement of the cog wheel 30 to return to the starting point. The function of the long cog 35 is to bring or slide the free end of the selecting pawl 32 into the recess 34, of the wheel 30, when said wheel leaves in rotation the zero or starting point at the stop 51, with which the long cog contacts.

The propulsion of the cog wheel 30, on the attraction of the armature 15, by the electro-magnets 14, is effected by means of a long, pivoted, wide strip or pawl 60, which is pivoted at 60×, in the depending ears 61, on the forward ends of the arms or plates 22, of the extension 22, of the armature, which are practically one piece. With the pivoted portion of the pawl 60 is connected a forwardly extended bell crank extension or arm 62 of the same width as the pawl. A strip spring 63 is connected at its inner end to the block 29 on the arms 22, by the

screw 29ˣ, previously referred to as the click, contacting with bar 28. The forward end of this spring is extended forwardly and also in a downwardly curved line in contact with the bell crank extension 62, of the pawl 60. The office of pawl 60 is to contact with and push the irregular cog-wheel 30 forward a given distance, two or more cogs, each time the electro-magnets 14 are energized, the distance or number of cogs being governed by the repeated attractions of the armature. Upon the standard 50 is a rigid stop or wedge 64, the lower portion of which extends in the direction of and upon one side of the wheel 30, and is inclined downwardly and its rear end bent at an angle and extended upwardly, these parts forming a compound wedge the lower portion forming an inclined bearing for the lower, curved end of pawl 60, and upon which the free end of pawl 60 slides intermittently toward the cogs upon the wheel 30, and yieldingly under the elastic force of the spring 63, the free end of the pawl when it strikes the said stop 64, wedges against the wheel thereof, checking its inertia and preventing the wheel from moving a greater distance than desired, and upon the upward movement of the pawl, the pawl is moved out of contact or away from the cog wheel by the upwardly extended portion of the compound wedge.

65 indicates the automatic timing pawl, which is a thin spring, so as to vibrate readily between its ends, and which is connected at its upper end rigidly with a pivot 66, mounted in the depending support 67, on the arms 22, extending from the armature 15, at a point on said arms in the direction of said armature from a vertical line extending through the axis of wheel 30, upon the lower end of which pawl is a hook 68, which is adapted to engage with the teeth upon the cog wheel 30, as further described. Upon the pivoted end of the pawl 65 is a rigidly connected arm 68ˣ, which extends nearly at right angles to the said pawl, and in the direction of the vertical line extending through the axis of wheel 30.

70 indicates a stop for the arm, which is connected with the upper end of one of the standards 27, and its outer end extended to a position above the arm 68ˣ, and a portion bent at right angles and extended downwardly a short distance. In the upward movement of the armature 15, when the electro-magnets are reënergized, the arm 68ˣ contacts with the stop 70, throwing the arm outwardly from the wheel 30.

71 indicates a weight connected with the outer end of a short arm 72, the inner end of the arm being rigidly connected with the pivoted upper end of the automatic timing pawl 65, the elasticity of the spring 65 overcoming the inertia and gravity of the weight.

Upon the central portion of base 10 and intermediate its longitudinal side portions is a block 73, composed of insulating material, to which is secured one end of a contact spring 74, by means of the screw 75. Upon the side of the cog wheel 30 approximately in the radius of the wheel midway between the recess 35 and the tooth 42, is a contact post 76, and the free end of the spring 74 extends upwardly toward the pivot of the wheel 30, in the path of the contact post 76, the said spring being insulated from the base 10.

With the end of spring 74, on the block 73, is fastened by screw 77 one end of a conducting wire 78, forming part of the bell circuit, the other end being connected with the binding screw 79, on the base 80, supporting electric signal or bell 81, which is in the electric bell circuit. With the other binding post 82 is connected a conducting wire 83, connected with the battery 84, and with said battery is connected a separate wire 85, which is connected with the binding post 86, on the end portion 10°, of the base 10, which base is also electrically included in the bell circuit.

In the operation of the invention the position of the irregular cog-wheel 30 is seen in Fig. 1, in readiness to receive the office call, the long cog 35 being in position of repose against the stop 51, on the post 50. To make the correct office call a number of pulsations in the battery circuit from battery 26ˣ, in predetermined sequence is established, in order to energize the magnets 14, attract the armature 15 and communicate the proper movement to the cog wheel 30, and bring the contact post 76 on the wheel in contact with the insulated plate 74, on the block 73, on the base 10, and close the circuit through the battery 74 and sound the bell 81. Assuming, therefore, that the correct office call is a long one, followed by a short call like a telegraphic code dot, then followed by two long calls or pulsations, of the key 26, the steps necessary to make the correct call will be as follows: The key 26 in the battery circuit 26ˣ, being closed upon contact point o^2, of the conductor o', a circuit is completed through the electro-magnets 14, energizing the electro-magnets and drawing down the armature 15 against the tension of the retracting spring 18 and bringing the extension 22, of the armature, down to the position seen in Fig. 3, in which movement the free end of the propelling pawl 60 slides upon the rigid stop 64 and engages with the cog 37, of the wheel, moving the wheel rotatively the distance of two cogs. The end of this pawl 60, will then rest on the rigid stop 64, at the point shown in Fig. 3, the incline of the stop causing the

pawl to wedge against the wheel and check its inertia and preventing the wheel from moving a greater distance than desired. The rotative movement of the wheel 30 will cause the long cog 35 to engage with the free end of the selecting pawl 32 and bring it down and into the recess 34, in the wheel 30, in which position the pawl will rest against the cog 35 by the tension of the spring 58, so long as the electro-magnets are energized. The downward movement of the arms 22 will take the arm 68^{x}, on the timing pawl 65, suddenly away from the rigid stop 70, thereby releasing gravity weight 71, which will descend rapidly, the vibrating arm 72 vibrating in the arc of a circle, as seen in dotted lines in Fig. 3, with the pivot 66 as the center. This motion will be imparted to the spring pawl 65 and hook 68, bringing the hook and spring suddenly against the periphery of the cog wheel 30, and the motion of the hook checked for a moment, and the weight 71 by its weight will complete a movement downwardly a short distance farther, thereby bending spring pawl 65, as shown in dotted lines in Fig. 3.

When the tension of the spring pawl 65 is sufficient to resist the control of the weight and bring it to rest, the spring pawl by its elasticity will spring back straight. This sudden reaction of the spring will cause the gravity weight to rebound to a position a little below that from whence it started to descend. The reaction of the spring pawl 65 and rebound of gravity weight 71 will also take the hook 68 away from the cog wheel 30. When the weight 71 has reached its highest point by reaction of the spring 65, it will suddenly descend, as before, bringing the hook 68 against the wheel 30, and vibrating, the spring pawl will again rebound. This rebounding will in a short time cease, leaving the hook 68 in repose under the cog 44, on the wheel 30. Now, should the magnets be deënergized in the opening of the key 26 and the circuit, the force of retraction of the spring 18 will raise the armature 15 and its extension 22, and the timing pawl 65, and will move the cog wheel in a partial rotation the space of one cog, and in this upward movement of the extension 22 the arm 68^{x} strikes against the rigid stop 70 and the timing pawl 65 and gravity weight 71 move outwardly and into their normal position, as seen in Fig. 1. Now, it is obvious, had the electromagnets been deënergized before the timing pawl had time to cease its rebounding or vibration the hook 68 would not be in repose or position long enough to move wheel 30 forward in rotation by the retraction of the spring 18. It is the rebounding of the timing pawl 65 that measures time for the apparatus and differentiates the mechanical movement in a long and short closing of the circuit.

The electro-magnets may be energized and deënergized any number of times without the timing pawl moving the cog-wheel 30, provided it is not energized long enough at any one time to allow the timing pawl 65 to come to rest. Now, as heretofore premised if the key 26 be closed long enough in this long, preliminary call for the timing pawl 65 to come to rest and hook 68 engage the tooth 44, of the wheel 30, and move said wheel in rotation a space equivalent to one more cog by the upward movement of the armature in the deënergizing of the electro-magnets, the selecting pawl 32 will slide over the end of the long cog 35, and controlled by its spring under the notch 36^{x}, in which position it will hold the wheel 30 from a reverse movement by the tension of its spring 52. This long close of key 26, being as assumed the first part of the complete office call, if a mistake had been made in the office call or the long pulsations in deënergizing the electro-magnets, and these magnets energized only a moment, then the timing pawl 65 would not have come into repose, therefore, in that event the cog-wheel 30 would have returned to its position as seen in Fig. 1, very quickly, being actuated by its own spring and that of the selecting pawl 32, in conjunction to return to the position of the long cog 35, against stop 51. The moment the free end of the pawl 60 is raised clear of cog 37, by the deënergizing of the electro-magnets, the extension 22 of the armature moves upwardly to the top bar 28. Assuming the first close of the key 26 was a long one, the wheel 30 would continue to be held by the selecting pawl in the notch 36^{x}. The next step in the making of the correct office call is a short close of the key 26, energizing the electro-magnets a very short time, like a dot in telegraphing, and as before, the extension 22, of the armature, will descend, the free end of pawl 60 will engage cog 39, in the same manner as it did cog 37, in the first part of office call. In like manner the cog wheel will move in rotation forward a space equivalent to two cogs, and the pawl 60 again wedges in stop 64 against the wheel 30. At this time cog 39 will be in the same position as cog 37, in Fig. 1, and the tooth 43 in the same position as tooth 44, and just above the hook 68, of the timing pawl. Now, if the key is opened and the electro-magnets deënergized before the timing pawl has time to cease rebounding the cog wheel 30 will be again held by the selecting pawl dropping into the notch 37^{x}, in the double cog 37. If the close of the key 26, however, be made long, like a dash in telegraphy and the electro-magnets energized until the timing pawl 65 comes into repose, then as before the hook

68 will propel the cog wheel forward one cog more, when the electro-magnets are deënergized, and this will leave the free end of the selecting pawl 32, back of the cog 37 and in recess 37°, where it will pass through and not hold the cog wheel 30 and by the tension of its spring aided by the spring on the selecting pawl will hasten the cog wheel 30 back to its starting point at stop 51, and in the return of the long cog 35 the latter will slide past the free end of the selecting pawl and come into the position seen in Fig. 1.

Assuming that the last call was correctly made and the electro-magnets deënergized quickly, the sliding pawl 32, as before stated, will hold the cog-wheel 30 resting, meanwhile, in the recess 37ˣ, of cog 37. This is the second step in the correct call, having now made one long and one short charge of the electro-magnets 14. The next, or third step in the office call is a long energizing of the electro-magnets, so that when the key 26 is closed, as in the preceding charges of the electro-magnets the propelling pawl 60 will descend and engage the cog 40, and move the cog wheel 30 forward the space equivalent to two cogs, as in the first and second part of the office call just described. This will bring the selecting pawl 32 in position in the recess 38° and the tooth 42 will be in position to be lifted by the hook 68, of the timing pawl 65, so it will be evident that if the electro-magnets be not energized long enough for the timing pawl 65 to come into repose and move the cog wheel the space equivalent to one more cog, it will be impossible for the selecting pawl to hold wheel 30 from a return movement to starting point, it being in the recess 38°, where it will pass through as before, whereas with a long energizing of the electro-magnets and the timing pawl coming to rest under tooth 42, the cog-wheel 30 will again move forward the distance equivalent to one cog and the selecting pawl be in the notch 39ˣ, at which point it will hold the cog wheel. This completes the third step in the office call, and by the forward rotation of the cog-wheel 30 the contact post 76 connected therewith is brought in position close to the spring plate 74, in its path, and in the next close of the key 26 the cog-wheel is again propelled forward a distance equivalent to the space of two cogs, the pawl 60 engaging the tooth 46. This completes the office call, the cog-wheel 30 being in the position as seen in Fig. 4, and the selecting pawl 32 is in the recess 39°, the hook 68 being in the blank space between cog 42 and recess 34, and in the contact of post 76 and plate 74 the circuit through battery 84 is closed and the bell 81 will be kept ringing so long as the electro-magnets are energized. Upon the deënergizing of the electro-magnets the armature 15 moves upwardly and the selecting pawl which is now in recess 39° will not hold the cog-wheel (see Fig. 4), and therefore the wheel will return to the position seen in Fig. 1, the separation of the post 76 from the plate 74 will open the bell circuit, and the bell will stop ringing. It is obvious that the cog wheel 30 can be moved any number of times in succession by holding the electro-magnets energized long enough for the timing pawl to come to rest. The messages, however, may be made through the battery circuit 26ˣ, by the ordinary telegraphic code without disturbing the selective signaling device and by the employment of the steps described the call or signal can be made without delay.

The invention may be employed in long telegraph or telephone circuits. In the latter the call can be made selectively without calling any other subscriber in a telephone circuit. Various changes in construction and operation may be employed, and I do not confine myself to these details which are embodied in the exact construction of the invention.

Having fully described my invention, what I now claim as new and desire to secure by Letters Patent is:

1. In an electric signaling device, a rotary cog wheel, suitable axial supports therefor, a power-actuated propelling pawl adapted to propel said wheel measured distances in the circle of rotation, and vibrating time-controlling devices acting intermittently and alternately with said propelling pawl, to move said wheel in rotation.

2. In electric signaling devices, the combination with a rotary cog wheel, of a pivoted armature having an extension and rebounding time controlling devices upon said extension of the armature adapted to engage with and move said wheel in rotation.

3. In electric signaling devices, the combination with a rotary cog wheel, of a pivoted armature having an extension, a propelling pawl upon said extension of the armature adapted to propel said wheel measured distances in the circle of rotation, and a vibrating pivoted hook upon said armature acting intermittently and alternately with said propelling pawl to move said wheel in rotation, and a gravity weight and an arm connecting said weight with said hook.

4. In electric signaling devices, the combination with a rotary cog wheel, of a pivoted armature having an extension, and a vibrating pivoted hook adapted to engage with and impart motion to said cog wheel, an arm connected with the pivoted end of said hook and a stop in the path of said arm, a gravity weight and an arm connected with the said weight and the pivoted end of said hook.

5. In electric signaling devices the com-

bination with a rotary cog wheel of a pivoted armature having an extension, a spring controlled pawl, and a compound wedge in the path of the pawl for effecting an engagement of the pawl with the said wheel in one position of the pawl with the wheel, and the disengagement of the pawl from the wheel in another position of the pawl.

6. In electric signaling devices the combination with a rotary cog wheel, a pivoted armature having an extension, a spring controlled pivoted pawl adapted to engage with the cog wheel, and a compound wedge consisting of a lower inclined bearing extending upon the side of the wheel and also in the path of the lower end of the pawl, and a bent portion thereof which is extended upwardly in the path of the pawl and adapted to form a bearing away from the cog wheel for the lower end of said pawl in the completion of its upward movement.

7. In electric signaling devices, an oscillating wheel and suitable axial supports therefor, irregular cogs and teeth on said wheel and having recesses and spaces between said cogs and teeth, in telegraphic signal succession, automatically acting devices imparting an oscillating motion to said wheel, and means for stopping the movement of said wheel, said automatically acting devices comprising a propelling pawl, power-actuated pivoted arms connected with said pawl, and a rebounding, vibrating pivoted pawl on said arms, said pawl having a hook adapted to engage with the teeth on said wheel, and a gravity weight, and a vibrating arm connecting said weight with said pawl.

8. In electric signaling devices, an oscillating wheel and suitable axial supports therefor, irregular cogs and teeth on said wheel having recesses and spaces between said cogs and teeth, respectively, in telegraphic signal succession, automatically acting devices adapted to impart motion to said wheel comprising a spring controlled propelling pawl engaging with the cogs on said wheel, said pawl having a hook adapted to engage with the teeth on said wheel, and a gravity weight and an arm connected with said weight and also with said pawl, and a pivoted selecting pawl adapted to engage with said cogs and the recesses in said wheel, and a retracting spring controlling said selecting pawl.

9. In an electric selective signaling device for sounding and selecting make and break signals the combination with an electric battery circuit and with electro-magnets in said circuit, of a pivoted armature having an extension therein, a lever, and a retracting spring connected with said lever, an independent battery circuit, and an oscillating spring-controlled return wheel in said circuit, and irregular cogs and recesses between said cogs in telegraphic signal succession, sounding stops in the path of said extension of the armature, and a spring-controlled propelling pawl, and a time-measuring rebounding engaging pawl adapted to assist in the movement of said wheel, and a contact post carried by said wheel adapted to control the closing of the signal circuit.

10. In an electric signaling apparatus, a base plate, standards thereon, a spring-controlled, oscillating or return wheel pivoted to said standards having irregular cogs, and recesses between in telegraphic signal succession, and one of said cogs extending beyond the line of the others, a post on said base plate, and a spring-controlled selecting pawl adapted to be drawn down under tension by said extended cog, a support on the base plate and a stop on said support in the path of the said extended cog.

11. In an electric signaling device, a base plate, standards thereon, an oscillating spring-controlled wheel pivoted axially to said standards having cogs and recesses in telegraphic signal succession, and one of said cogs extending beyond the line of the others, a post on said base plate, a spring-retracted pivoted selecting pawl in the path of said extended cog, and a separate post on the base plate and a stop thereon in the path of said extended cog, electro-magnets carried by said base plate, an armature having an extension thereon and standards upon said base plate to which said armature is pivoted, and a lever on the pivoted end of said armature, and a retracting spring connected with the lever and also with a connecting device on the base plate, a spring-controlled wheel propelling pawl connected with the extension of said armature, and a time-measuring vibrating pawl and hook on said extension, and a gravity weight, and a vibrating arm connected with said pawl and said weight, and means for exciting electrically said magnets.

12. In electric signaling apparatus, a base plate, standards thereon, an oscillating spring-controlled wheel pivoted axially to said standards having cogs and recesses in telegraphic signal succession, and one of said cogs extending beyond the line of the others, a contact post on said wheel, and a post on the base plate, and a stop on said post in the path of the extended cog on said wheel, a post on said base plate, a spring-controlled pivoted selecting pawl in the path of said extended cog, electro-magnets carried by said base plate, and an armature and standards on the base plate to which said armature is pivoted, arms extending from said armature, a lever connected with the armature, a retracting spring connected with said lever, and with a support on the base plate, a spring controlled pivoted propelling pawl on said extension arms of the armature, and

a forwardly extended bell-crank lever on said pawl upon which said spring contacts, an inclined stop and a separate post therefor on said base plate, a pivoted time-measuring vibrating pawl on said extension of the armature, an arm on said pawl, a gravity weight, a vibrating arm connected with the weight and said pawl, and a stop on one of said standards in the path of said arm in the upward movement of the extension of said armature, and means for electrically energizing the electro-magnets.

WILLIAM W. ALEXANDER.

Witnesses:
M. C. GILLHAM,
HOTE B. MIDLAM.