

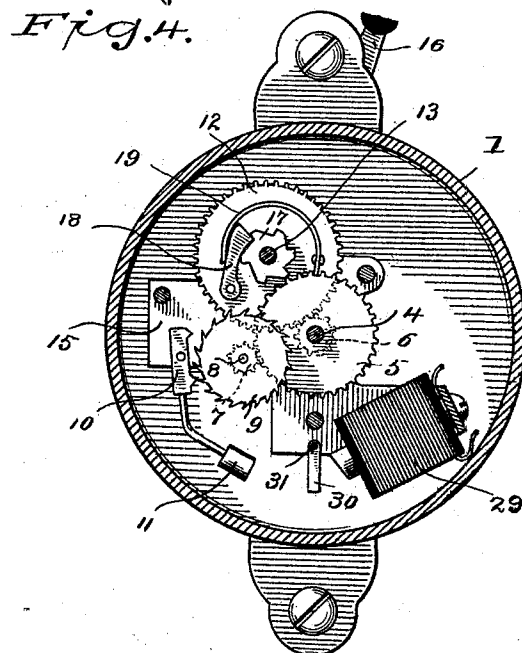
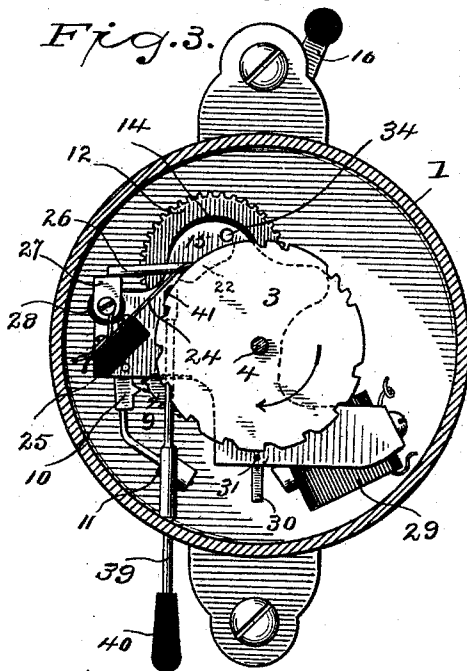
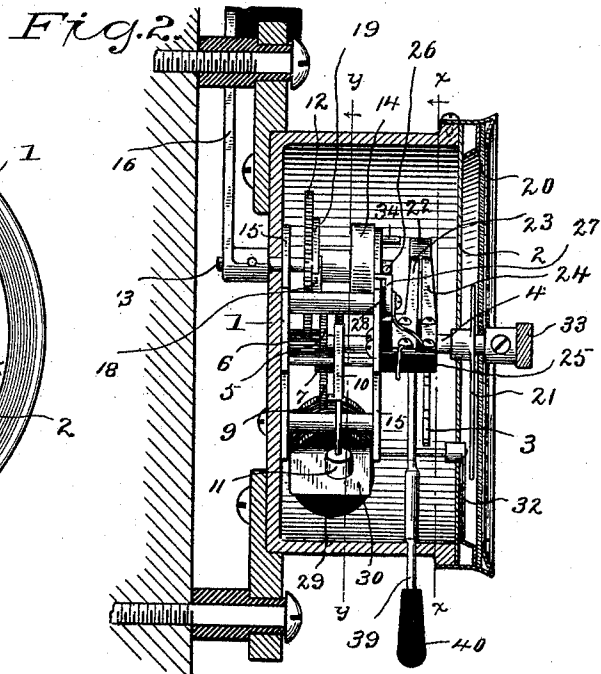
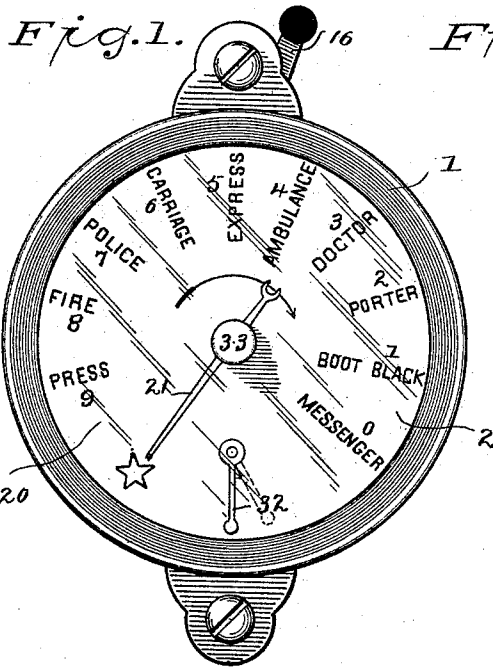
(No Model.)

2 Sheets—Sheet 1.

W. F. BANKS.
ELECTRICAL CALL BOX.

No. 499,003.

Patented June 6, 1893.



WITNESSES

H. F. Lamb
Pearl M. Reynolds

INVENTOR

Walter F. Banks
By J. M. Wooster
Att'y

(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

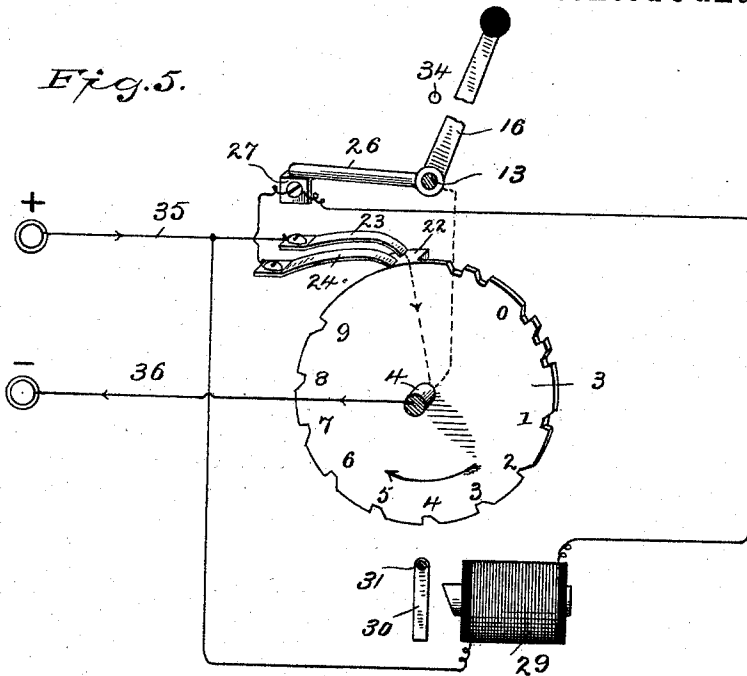
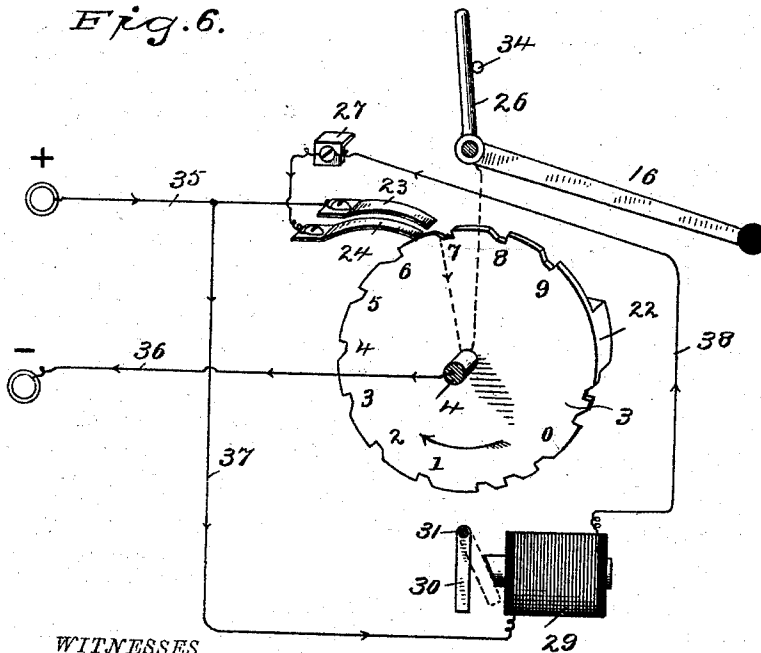


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

WALTER F. BANKS, OF MILFORD, CONNECTICUT.

ELECTRICAL CALL-BOX.

SPECIFICATION forming part of Letters Patent No. 499,003, dated June 6, 1893.

Application filed November 25, 1892. Serial No. 453,069. (No model.)

To all whom it may concern:

Be it known that I, WALTER F. BANKS, a citizen of the United States, residing at Milford, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Electrical Call-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to produce a call box which shall be simple, compact, inexpensive to produce, and which will send in the calls quickly; to produce a call box, provided with a visual indicator, which after it has been set for a call will indicate unerringly if any box in the circuit is in use, and which may also be used to give a return signal if desired, these signals requiring but small battery power and insuring that but one call be sent in at a time, thereby permitting many more boxes to be placed in a circuit; to produce a call box in which the mechanism cannot be set in motion without first setting it to a call; to produce a call box so constructed that if set to a wrong call the pointer can be turned forward and reset to the right call; to produce a call box in which the escapement is in motion while setting a call and is provided with a scape wheel and pallet so that the speed at which the break wheel can be moved in setting a call is limited and the liability of error is reduced to the minimum; to produce a call box in which, after the pointer has been set and the call sent in, all of the parts return to their normal position automatically; to produce a call box having a break wheel provided with circuit breaking notches which indicate the calls at the main office; to produce a call box in which the current is short circuited and all the operative parts cut-out when the box is not in use; to produce a call box having an indicator controlled by a swinging gravity armature; to produce a call box in which no extra circuits or ground connections are required, which can be readily organized for any number of calls, of which any reasonable number may be used in the same circuit, and which can be used on the same circuit with other kinds of boxes.

With these ends in view I have devised the novel construction which I will now describe referring by numerals to the accompanying drawings forming part of this specification in which—

Figure 1 is a front elevation of my novel call box in position for use; Fig. 2 a vertical section of the box showing the operating mechanism in side elevation; Fig. 3 a section on the line *xx* in Fig. 2 looking toward the left; Fig. 4 a section on the line *yy* in Fig. 2 looking toward the left; Fig. 5 a diagram view illustrating the passage of the current, the pointer, break wheel and crank being in the normal position, and Fig. 6 is a similar view the pointer and break wheel having been set and the crank having been pulled down to send in a call.

1 denotes the case which is of ordinary construction, that is to say a cast metal box which is adapted to be attached in place in any suitable manner. In the front of the box is a dial 2 on which is printed the different calls the box is capable of making. In the present instance I have illustrated a ten call box, but a larger or smaller number may be used, the number of calls depending of course upon the number of notches in the break wheel, which I have denoted by 3. The break wheel is carried by a shaft 4 which also carries a gear wheel 5 and a pinion 6. The gear wheel meshes with a pinion 7 on a shaft 8 which also carries a scape wheel 9, the teeth of which are engaged by a pallet 10. I have shown the pallet as provided with an arm and weight 11. These however are not essential and may or may not be used to reduce the motion of the train. By providing a scape wheel and pallet I make it impossible to turn the pointer and shaft 4 at a very high speed, so that the danger of loss of time caused by turning the pointer past the desired call, is reduced to the minimum. Pinion 6 on shaft 4 meshes with a gear wheel 12 which is mounted on the main shaft 13 but is not connected thereto, so that said gear wheel is free to be turned independently of the shaft. The train is driven by a main spring 14 coiled on the main shaft, one end of said spring being attached in the usual manner to said shaft and the other to any suitable portion of the framework. All the

parts of the train are carried by front and rear plates 15, the rear plate being rigidly secured to the case. The main shaft passes through either wall of the case, the rear wall in the present instance, and carries an operating crank 16. 17 denotes a ratchet rigidly secured to the main shaft. In the present instance I have shown this ratchet as provided with six teeth, the train of course being organized to correspond therewith.

18 denotes a pawl pivoted to gear wheel 12 and engaging the ratchet, and 19 a spring acting to retain the pawl in operative position, as clearly shown in Fig. 4. Shaft 4 extends through the dial and through a glass 20 at the front of the case, and is provided with a pointer 21 lying in the present instance between the dial and the glass, and with an operating knob 33 outside of the glass. The dial is provided with a mark as for instance a star which is so located as to correspond with the normal position of the pointer, and also bears upon its face the names of the different calls which it is desired to make at the central office.

For convenience in description I have placed upon the dial in addition to the names of the calls, characters 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 and have also placed the same characters at the notches in the brake wheel which produce the corresponding calls. It will be noticed that there are nine notches in the brake wheel all the same size and the same distance apart and that following these are three smaller notches closer together, followed in turn by two notches also close together. Each of the larger notches corresponds to one of the calls, and the three smaller notches followed by two smaller notches gives the call 32 which is arbitrarily chosen as the number of this box. For example the call of the box number alone at the main office is one of the calls and upon the drawings said call is indicated as call 0, the second call at the main office would be 1 followed by 32, the third call would be 2 followed by 32 and so on, 9 followed by 32 being the tenth call. By making the notches in the brake wheel which indicate the box call closer together than the others it is made quite easy to distinguish at both ends of the line, by sound alone the breaks indicating the call of the box number from the breaks indicating the other calls. The calls may of course be arranged in any desired order, preferably so that the calls most frequently used will be the shortest, and may be sent in quickest. For example the call for messenger which I have designated call 0, is simply the call of the box number, the next call, in the present instance boot black, is 1, followed by the box number. As a matter of fact the shortest calls require a little the most time in setting as the pointer must be moved farther.

Upon the back of the break wheel is a lug 22 which is adapted to be engaged by a brush 23, see Fig. 5. Close beside brush 23 is a

brush 24 which lies in position to engage the periphery of the break wheel and to break the circuit when the brush passes into any of the notches, brush 23 being wholly disengaged from the break wheel except when lug 22 is in position to be engaged thereby. These brushes are secured to an insulating block 25 which is itself secured to the front plate 15. At the inner end of main shaft 13 is an arm 26 which in the normal position engages a contact block 27 which is insulated by a washer 28.

34 denotes an arm extending outward from the front plate 15 which serves as a stop to limit the movement of arm 26 when the main shaft is operated by the crank. It is an important feature of my invention that this stop is so located as to prevent the main shaft from being turned far enough by the operating crank to permit pawl 18 to pass over a tooth on ratchet 17 on the main shaft unless the pawl has been already moved forward away from the tooth with which it has been engaged by manipulation of operating knob 33 on shaft 4, all of which will presently be more fully explained.

29 denotes an electro magnet which is secured between the plates 15, and 30 is a swinging gravity armature carried by a rod 31 which is journaled in said plates and extends forward through the dial and is provided at its front end with an indicator 32, said indicator lying in the present instance between the dial and the glass as indicated in Fig. 2.

The passage of the electric current will be clearly understood from Figs. 5 and 6. Fig. 5 illustrates the normal position of the parts and the normal passage of the current. The positive or incoming wire is denoted by 35. The current passes to brush 23 which is in contact with lug 22 on the break wheel thence out by means of negative or outgoing wire 36. Suppose now that it is desired to send in a call, for example call 6, carriage. The operator first turns the pointer, shaft 4 and the break wheel by means of operating knob 33 until the pointer registers with the word carriage on the dial. It should be noted that the mere turning of the pointer, shaft 4 and the break wheel has accomplished no apparent result but has simply cut in the electro magnet. This is an important feature of my invention as it enables the operator in case he has turned the pointer too far for the call he wished to make, to keep on around with it and stop at the proper call next time. The pointer, shaft 4 and the break wheel cannot be turned backward owing to the engagement of pallet 10 with the scape wheel, but they may be turned forward an unlimited amount without the slightest injury to the box or result of any kind, in fact the pointer can be left at any position on the dial that it may happen to be, and when a call is to be made the operator simply turns it forward until it registers on the dial with the call required. The effect of turning shaft 4 and the break

wheel forward is clearly shown in Fig. 6 in which brush 23 is shown as out of contact with anything, said brush being adapted only to engage lug 22 when the latter registers therewith, and brush 24 engaging the periphery of the break wheel between notches 7 and 6. The parts will now be in the position shown in Fig. 6 except that arm 26 will not have been moved away from contact block 27 but will lie in engagement therewith as shown in Fig. 5. The instant that the rotation of the break wheel shall have carried lug 22 out of contact with arm 23 the current will pass through wire 37 to electro magnet 29 thence by wire 38 to contact block 27, arm 26 being in engagement with the contact block as shown in Fig. 5. It follows that the current will divide the larger portion passing through arm 26 to main shaft 13, thence through the case and out by wire 36, the remainder passing through brush 24, while it is in contact with the break wheel, to shaft 4 and out as before. While brush 24 is not in contact with the break wheel, as when passing over a notch, the whole current flows through arm 26 and out by wire 36 as before. This arrangement keeps the circuit unbroken while the break wheel is being set. The instant the current commences to pass through the electro magnet the pole becomes magnetized and the armature is drawn into contact therewith as indicated by dotted lines in Fig. 6. As soon as the rotation of the break wheel brings the first notch, indicated by 9, in the break wheel under brush 24 it is obvious that the current will be broken as the brush does not drop into the notch far enough to retain contact with the break wheel. The effect of the break in the circuit is to produce a signal at the main office. What this signal is forms no part of my present invention. It is sufficient to say that it may be produced in any suitable manner, as by an indicator, by sounding a bell, or by an ordinary, or a printing telegraph instrument. The instant the current is broken the electro magnet is of course deprived of its magnetism and the swinging armature drops away from the pole by gravity to the position shown in full lines in Figs. 5 and 6 leaving indicator 32 in the position shown in Fig. 1, the position of said indicator when the armature is in engagement with the pole of the magnet being indicated by dotted lines in Fig. 1. It is of course understood that the different boxes in the circuit are placed in series so that the instant the circuit is broken by the movement of any break wheel in the circuit any indicator in the series that may be cut in will be caused to vibrate each time the circuit is opened and closed.

The special style of indicator is not of the essence of my invention. It is of course apparent that the indicator may cover a slot in the case and disclose a different color each time the indicator vibrates.

It is sufficient for the purpose of my invention to make the indicator vibrate as that

gives positive indication the instant the break wheel is moved to set it, whether a call is being sent in from any other box on the circuit. After the pointer, shaft 4 and the break wheel have been set as already described if the indicator remains stationary it is manifest that the line is not in use. The operator can then send in a call in the manner I shall presently describe. If however after setting the break wheel, the indicator is seen to be in motion the operator must wait until the call that is being sent in is completed, before sending in his own call.

As already stated I have shown the ratchet as provided with six teeth and have organized the train to correspond therewith. The organization is such that it takes an entire revolution of the break wheel to move the ratchet one tooth, that is to say far enough so that the pawl will drop off from one tooth on to the next one, or as it is commonly called "click." It follows therefore that anything less than a full revolution of the break wheel will carry the pawl a distance away from the last tooth but not far enough to cause a click, and that if the break wheel is turned around continuously a succession of clicks is produced but no other effect upon the mechanism, as rotation of the break wheel simply produces rotation of gear wheel 12 on the main shaft but does not affect the main shaft in the slightest. In this connection I desire to again call attention to the fact that stop 34 is so placed as to be engaged by arm 26 before the main shaft shall have been carried far enough by movement of the operating crank to cause the pawl to engage another tooth. Suppose now that the break wheel has not been set. If the operator moves the crank he simply carries the pawl part way over a tooth of the ratchet and not far enough for it to engage the next tooth so that when he releases the crank the spring simply throws it back to its normal position but without affecting the ratchet in the slightest. But if the break wheel has been set by movement of shaft 4 that movement necessarily carries gear wheel 12 and the pawl forward upon one of the teeth of the ratchet. Movement of the break wheel for even the short distance required to make call 9 being amply sufficient to carry the pawl forward sufficient distance so that when the operating crank is moved, the distance that the ratchet will be moved thereby, will carry it past the pawl so that a call will be sent in. The operation of sending in a call therefore is briefly as follows: The pointer is set to the call required by manipulation of knob 33 on shaft 4. This sets the break wheel. In other words it places the break wheel in such a position that brush 24 is in contact with the periphery thereof between the notch corresponding to the required call and the notch that precedes it the way the break wheel is turned; in other words the break wheel and the pointer are so adjusted upon

shaft 4 that when the pointer is caused to register with any call upon the dial, brush 24 will be in contact with the periphery of the break wheel just in advance of the notch in the break wheel corresponding to that call. If the indicator is not in motion after the pointer has been set the call may be sent in. If the indicator is in motion the operator must wait until the motion ceases. The operator then pulls down the crank until it is stopped by engagement of arm 26 with stop 34, or until the pawl clicks upon the ratchet. This movement of the crank winds the spring, which the instant the crank is released sets the train in motion, completes the revolution of the break wheel thereby sending in the desired call, returns the pointer to its normal position, and also returns the crank to its normal position.

In order that the operator may receive a return signal from the main office if he so desires I provide a push rod 39 the outer end of which extends through the case and is provided with an insulated finger piece 40, and the inner end of which is provided with an insulated head 41 which is adapted to engage brush 23 and lift it out of contact with lug 22 on the break wheel. This of course changes the passage of the current and compels it to pass through wire 37, through the electro magnet and through wire 38 to contact block 27. The instant the pole of the electro magnet becomes magnetized the armature is drawn to it and remains in contact therewith as shown in dotted lines in Fig. 6 until the circuit is broken in any suitable manner by the operator at the main office.

As the main office system forms no portion of my present invention I do not wish to describe any portion of it in detail. It is sufficient to say that the operator at the main office after receiving a call manipulates a push button or any suitable fixture which breaks the circuit. The breaking of the circuit causes the armature to drop away from the pole of the magnet. The instant the circuit is closed again at the main office the armature is drawn to the pole again causing the indicator to vibrate as already described. The person sending in the call now releases the push rod which allows brush 23 to drop back into contact with lug 22 and the current passes out as already described in connection with Fig. 5, the armature dropping down to its normal position as shown in Figs. 4 and 5.

It will of course be understood that the various details of construction may be changed to an almost unlimited extent without departing from the principle of my invention.

I claim—

1. In combination with suitable electrical connections, the brushes 23 and 24 and the break wheel having a lug 22 engaged by brush 23, when the parts are in normal position, a series of peripheral notches to indicate different calls an electro magnet and a swinging

gravity armature which is drawn into contact with the pole of the magnet the instant the short circuit is broken by the disengagement of brush 23 and lug 22 whereby the current is caused to pass through the electro magnet, said armature falling away again each time brush 24 registers with the notch in the break wheel and breaks the current, the rod connected to and carrying the said armature and a visual indicator at the outer end of said rod which is vibrated each time the armature is drawn toward or released from the magnet, substantially as described.

2. In combination, the main circuit, the breaking wheel having notches and the lug 22, the brush 23 arranged in the main circuit to contact with the lug 22 and short circuit the current, the brush 24, under which the notches in the wheel pass, said brush being in a shunt of the main circuit and through which a part of the current passes when the brush lies on the periphery of the wheel between the notches, and a lever for setting in motion the break wheel said lever also being in a shunt circuit which normally receives the current when the brush 24 is over a notch, said lever being arranged to break said circuit when setting the break wheel in motion, substantially as described.

3. The combination with suitable electrical connections brushes 23 and 24 and the break wheel having a lug 22 engaged by brush 23 when the parts are in the normal position, a series of peripheral notches to indicate the box call, and single notches to indicate in connection with the box call other calls of an electro magnet and a swinging gravity armature which is drawn into contact with the pole of the magnet the instant the short circuit is broken by the disengagement of brush 23 and lug 22, whereby the current is caused to pass through the electro magnet, said armature falling away again each time brush 24 registers with the notch in the break wheel and breaks the current.

4. The combination with suitable electrical connections, brushes 23 and 24 and the break wheel having lug 22 adapted to be engaged by brush 23 and peripheral notches adapted to register with brush 24, of an electro magnet, a swinging gravity armature adapted to be drawn to the pole when the magnet is in circuit, and a push rod having an insulated head adapted to break the contact of brush 23 with lug 22 whereby the magnet is placed in circuit when the parts are in their normal position, as and for the purpose set forth.

5. The combination with suitable electrical connections and brushes 23 and 24, of shaft 4 carrying a break wheel having a lug 22 adapted to be engaged by brush 23 and peripheral notches adapted to register with brush 24, a pointer 21 at the outer end of the shaft, a dial over which the pointer travels, an electro magnet and a swinging armature therefor carried by a rod having at its outer end an indicator

32 which is vibrated over the face of the dial each time the armature is drawn toward or released from the magnet.

5 6. The combination with suitable electrical connections and brush 24, of shaft 4 carrying a break wheel having peripheral notches adapted to register with said brush for the purpose set forth, an operating knob at the outer end of said shaft, the main shaft, the
10 main spring, and a train of gearing having a scape wheel and a pallet by which motion of the train is controlled when the break wheel is moved by the operating knob.

15 7. The combination with suitable electrical connections brush 24, and shaft 4 carrying a break wheel having peripheral notches adapted to register with said brush for the purpose set forth, of the main shaft having a ratchet fixed thereto, a gear wheel 12 loose on the
20 main shaft and carrying a spring actuated pawl engaging the ratchet, a main spring and a train of gearing between shaft 4 and the main shaft whereby when shaft 4 is moved in setting the break wheel gear wheel 12 is turned
25 on the main shaft and the pawl moved forward over a tooth of the ratchet, and when the main shaft is moved the ratchet is carried away from the pawl and the spring is wound so that when the shaft is released the spring
30 will carry the entire train and will return both shafts and the break wheel to their normal position.

35 8. The combination with suitable electrical connections brush 24 and shaft 4 carrying a break wheel having peripheral notches as set forth, of insulated contact block 27, the main shaft having a crank and an arm 26 engaging said block, stop 34 adapted to be engaged by said arm for the purpose set forth and a spring
40 actuated train of gearing between shaft 4 and the main shaft.

9. The combination with suitable electrical connections, brush 24 and shaft 4 carrying a break wheel having peripheral notches adapted to register with said brush, of the main
45 shaft having a ratchet fixed thereto, an operating crank and an arm 26, a gear wheel 12 loose on the main shaft and carrying a spring actuated pawl engaging the ratchet, a main spring, a train of gearing between shaft 4 and
50 the main shaft, a contact block 27 with which arm 26 is normally in contact, and a stop 34 which is engaged by said arm to limit the oscillation of the main shaft as and for the purpose set forth. 55

10. The combination with suitable electrical connections, brush 24, shaft 4 and the break wheel having peripheral notches as set forth, of the electro magnet, the swinging gravity
50 armature, the main shaft having arm 26, stop 34 adapted to be engaged by said arm to prevent the main shaft being carried far enough to cause the pawl to engage another tooth, and a spring actuated train of gearing between shaft 4 and the main shaft. 65

11. The combination with suitable electrical connections, brush 23 and the break wheel having lug 22, of the electro magnet, the swinging gravity armature and a push rod adapted to engage said brush and lift it out of contact
70 with lug 22 whereby the current is sent through the electro magnet and the armature is drawn to the pole thereof and retained until the circuit is broken.

In testimony whereof I affix my signature in 75 presence of two witnesses.

WALTER F. BANKS.

Witnesses:

A. M. WOOSTER,
P. M. REYNOLDS.