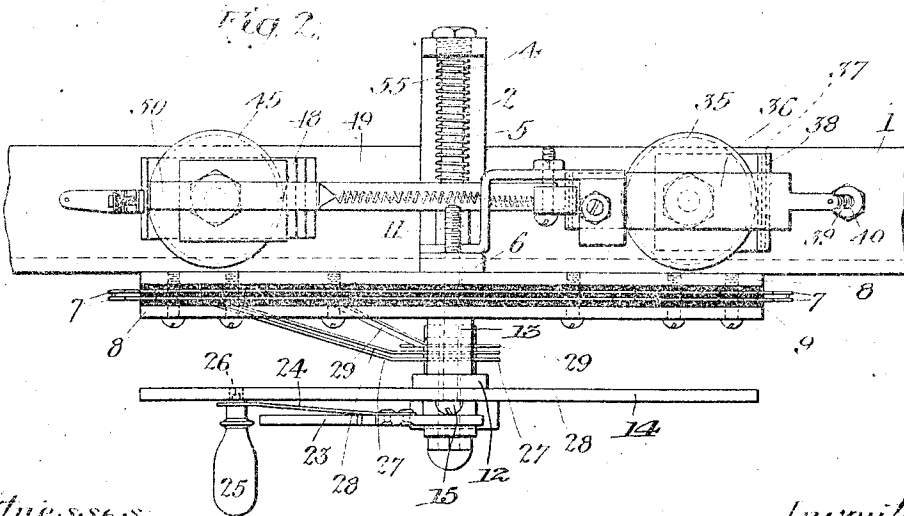
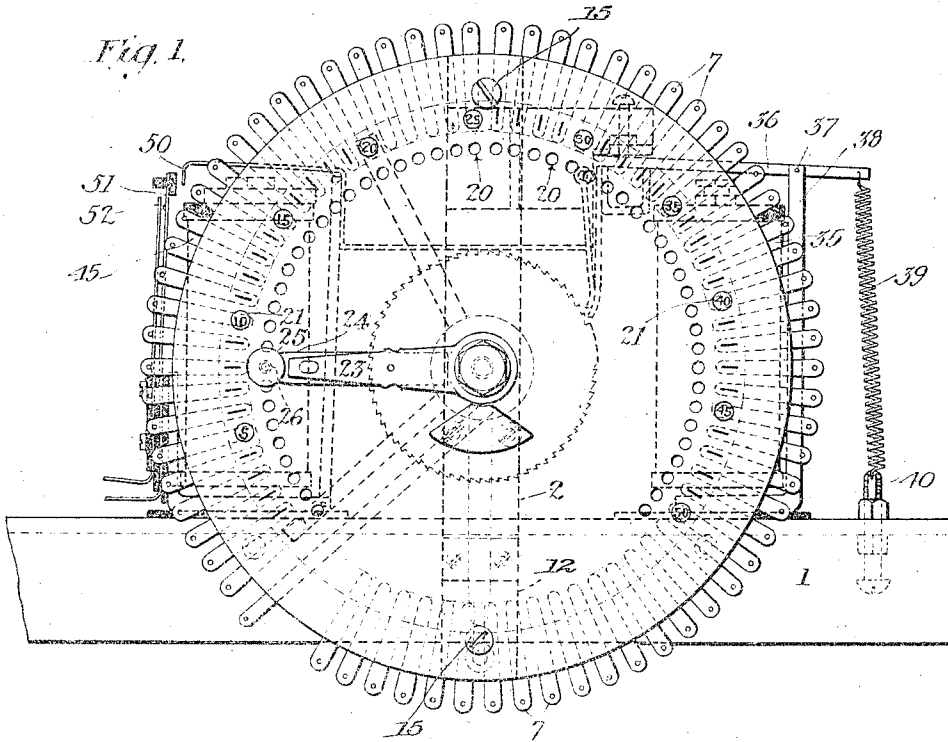


C. R. AUSTIN.
IMPULSE TRANSMITTER.
APPLICATION FILED FEB. 15, 1911.

1,036,056.

Patented Aug. 20, 1912.

4 SHEETS—SHEET 1.



Witnesses:

Wm. A. H. Co.
J. D. Thornburgh

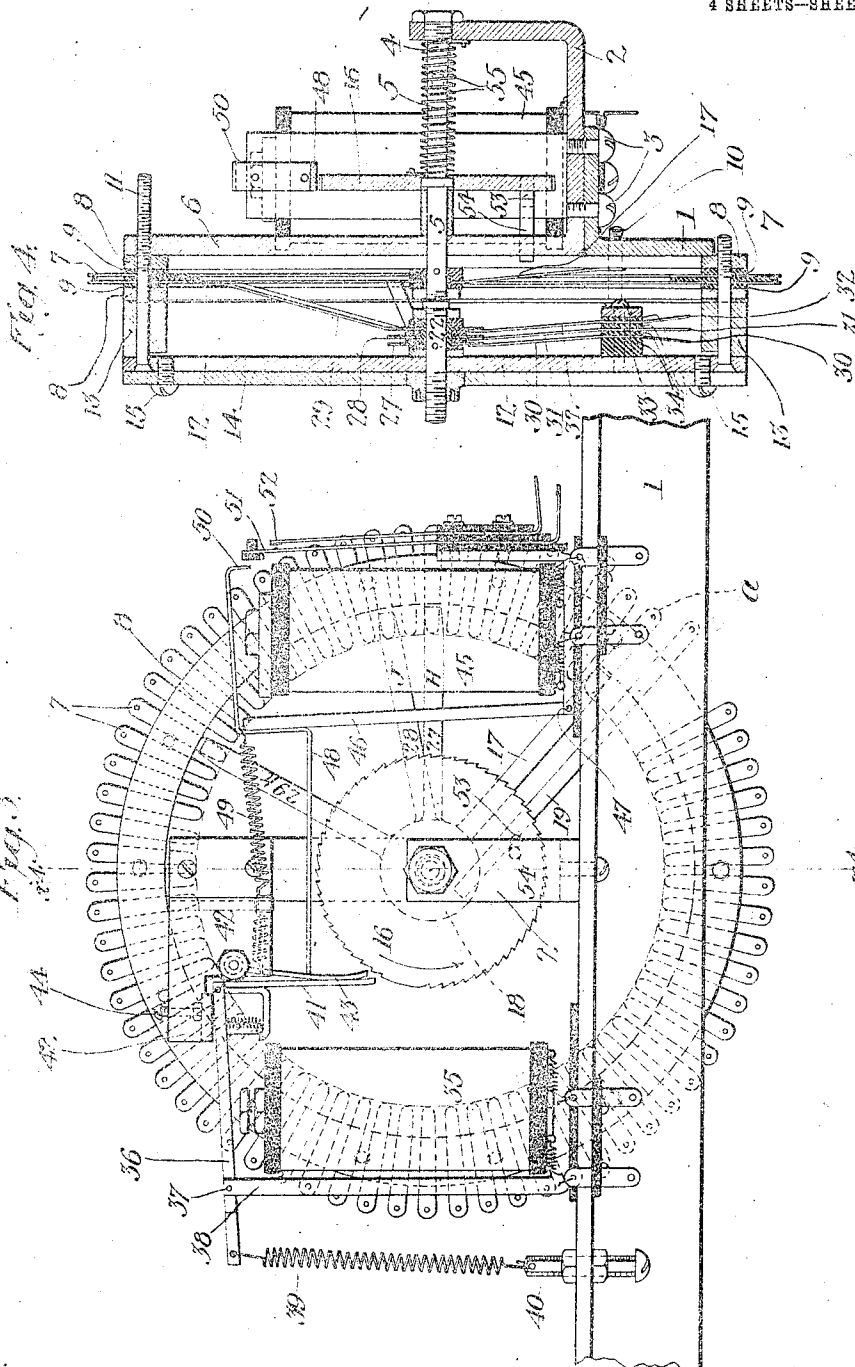
Inventor:
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by a *James H. H. H. H. H.*
attys.

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4 SHEETS—SHEET 2.



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4 SHEETS-SHEET 3.



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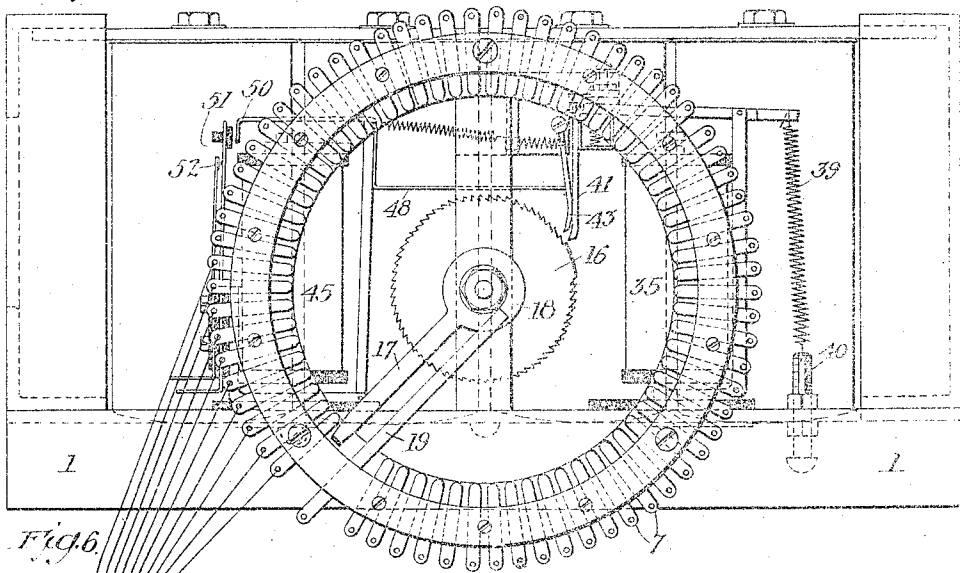


Fig. 6

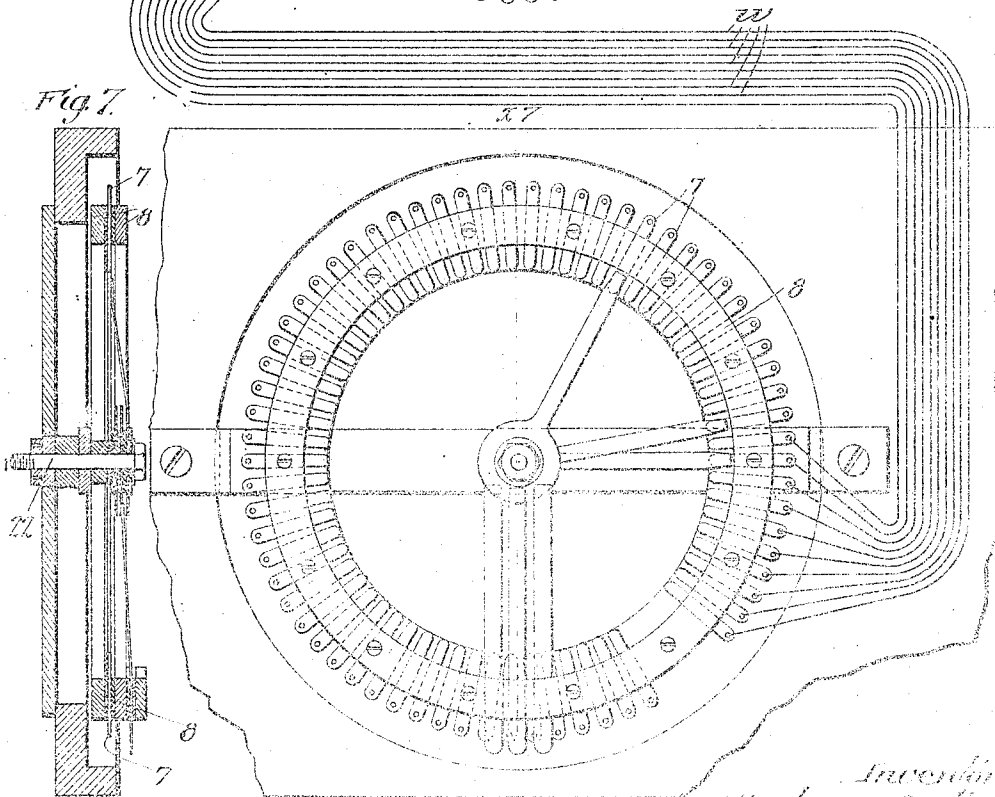


Fig. 7

Printed by
 J. D. Thompson

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 Charles R. Austin.
 Attest
 J. D. Thompson

UNITED STATES PATENT OFFICE.

CHARLES R. AUSTIN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO SOUTHERN CALIFORNIA MANUFACTURING COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

IMPULSE-TRANSMITTER.

1,036,056.

Specification of Letters Patent.

Patented Aug. 20, 1912.

Application filed February 15, 1911. Serial No. 608,818.

To all whom it may concern:

Be it known that I, CHARLES R. AUSTIN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Impulse-Transmitter, of which the following is a specification.

This invention relates to a dial operated impulse transmitter for telephone systems, and the main object is to furnish a more perfect electric impulse and to produce the impulses consecutively of uniform character. The ordinary impulse transmitter is operated mechanically and involves a spring and governor which are liable to vary somewhat in operation, both as to time and character; while, in the present invention the mechanism of the impulse transmitter is operated electrically and exactly measures each impulse, so that all impulses are substantially uniform and in more perfect time. This enables the switch to be operated much faster and with greater accuracy. Any inequalities in the impulse affects both the impulse transmitter and the switch, whereby the members sent out by the impulse transmitter will necessarily correspond with that set by the switch. Another advantage is that there is no return movement of the manually operated indicating arm which, when once placed on a certain number, will stay on that number and repeat the same unless reset at another number.

Another object is to produce automatic ringing, whereby the operator sets the indicating arm at the number to be called, the dial mechanism then automatically transmits the required impulses to properly set the switch and when the switch is set, the dial mechanism automatically sends the ringing current over the line for a definite period, at the conclusion of which the ringing stops, this operation taking place without attention of the operator, except the setting of the indicating arm at the number to be called.

Referring to the drawings: Figure 1 is a front elevation. Fig. 2 is a plan view. Fig. 3 is a rear elevation. Fig. 4 is a section on line x^4-x^4 in Fig. 3. Fig. 5 is a diagrammatic view showing the manner of connecting the instrument in a system. Fig. 6 is a diagrammatic view showing the dial mem-

ber separated from the switch member. Fig. 7 is a sectional view on line x^7-x^7 Fig. 6.

1 designates an angle iron to which is attached a bracket 2 by means of screws 3, and screwed in the bracket 2 is a stud 4. A shaft 5 has one end journaled in the stud 4 and its other end journaled in the upright arm 6 of the bracket 2. A series of contacts 7 are clamped between two rings 8, being insulated therefrom by rings of insulation 9, the rings 8 being secured to the angle iron 1 by screws 10 and to arm 6 by screws 11, which screws pass through a supporting plate 12, the inner ring 8 being separated from the plate 12 by sleeves 13. Secured to the supporting plate 12 is a dial 14 being attached by screws 15.

Rigidly attached to the shaft 5 is a ratchet wheel 16 and attached to the shaft 5 is a brush 17 which, as shaft 5 revolves, wipes the contacts 7. The brush 17 has a disk-like hub 18 and a wiping spring 19, which passes through and is held by ring 8, and makes electrical contact with the disk 18 of the brush 17 when the latter is in any position. The dial 14 has a series of holes 20 arranged in a circle and numbered from one to fifty, or as many, more or less, as may be required, according to the capacity the instrument is to have, the designating number of the hole being shown inclosed in a circle 21 and arranged opposite every fifth hole. Journaled in the supporting plate 12 is a shaft 22 to which is attached an arm 23 and riveted to the arm 23 is a spring 24 on which is a handle 25. The inner end of the handle 25 has a plug 26 adapted to fit loosely in any of the holes 20 and being held firmly in any hole in which it is placed by the tension of spring 24, thus preventing the arm 23 and shaft 22 from turning accidentally. By pulling the handle 25 out until the plug 26 is free from the hole in the dial, the handle and its carrying arm 23 can be revolved in an arc over the face of the dial, allowing the plug 26 to be placed in any of the holes 20. Fixed to the shaft 22 at the back of the dial 14 are three brushes 27, 28 and 29. These brushes at the point where they are attached to the shaft are larger than the shaft, thus forming a disk-like hub or rim which projects as a flange from the shaft. Three wiping springs 30,

31 and 32 are attached to the supporting plate 12 by a screw 33 and insulated therefrom and from each other by insulation 34. The three wiping springs 30, 31 and 32, respectively, make contact with the three disk-like hubs of the wipers 27, 28 and 29, irrespective of the angular position of the latter.

An electric magnet 35 supported on the angle iron 1 has an armature 36 pivoted at 37 to a support 38, and having a restoring spring 39, the strength of which is regulated by screw 40. Pivotaly carried on the end of the armature 36 is a pawl 41 which when in operation engages the ratchet wheel 16. A lug 42 on the arm 6 carries the stop pawl 43 and adjusting screw 44 for the armature 36.

45 is an electric magnet with armature 46 pivoted at 47 and having an arm 48 which normally rests against the pawl 43. A spring 49 causes the armature 46 to hold both pawls 43 and 41 out of engagement with the ratchet wheel 16, except when the magnet 45 is energized and armature 46 is attracted. The arm 48 has an extension 50 which controls two electrical contact springs 51 and 52. A stop pin 53 in the ratchet 16 normally rests against a pin 54 in the bracket 2, being held there by the tension of a spring 55 which encircles shaft 5 and forces the ratchet wheel 16 inwardly, also causing brush 17 to rest on contact *a*.

In operation, to call a number by means of the dial, the handle 25 is pulled out until spring 24 rests against the arm 23 and then revolved until the plug or jack 26 can be placed in the hole 20 in the face of the dial corresponding to the number to be called. As the arm 23 is thus revolved, the hub contacts 27, 28 and 29 turn therewith and contact 27 comes to rest on a contact 7 corresponding to the number of the jack in which the plug 26 is placed. The hub contact 28 rests on a contact 7 (preferably the second) following that on which contact 27 rests, while the contact 29 rests on a contact 7 following that on which the contact 28 rests, but removed therefrom by a number of intervening contacts 7, depending on the length of ring to be given, which is determined by properly adjusting the angular relation of the contact 29 to the contacts 27 and 28. A key 56 is then pressed which locks itself down and connects the dial by a relay 57 to a trunk and energizing release magnet 45, the circuit being made from battery *b*, through wire 45^a to wire 45^c to wire 45^b to wire 45^a, through the winding of release magnet 45, through wire 60 to wire 59 to relay 57, and through the windings thereof to wire 58 to key 56 to ground and from ground to battery *b*. Battery current now flows through wire 45^c to resistance *R*, through wire 83 and wire 83^a to contact 57^a of relay 57 (the armature of relay 57 being

up), thence through wire 57^b to sleeve side of trunk. Relay 57 and release magnet 45 are now energized and their armatures are up. Release magnet 45 on becoming energized allows pawls 43 and 41 to engage the ratchet 16 and close contacts 51, 52. Circuit is then made from battery *b* through wire 45^a to armature 45^c which is down, through wires 61, 62 to contact 63 of vibrating relay C, and through the contacts 63, 64 of the latter, through winding of magnet C, thence through wires 66 and 76 to contacts 52 and 51 of magnet 45 to wire 67 to ground. This starts relay C vibrating and sends pulses of current from middle contact 63 of relay C to top contact 65 of same, through wire 68 to magnet 35, to wire 69 to ground, and also through left hand contact of relay D and wires 70 and 71 to contact 72 of relay 57, to wire 73 and tip of trunk line. Each pulsation from relay C passing through wire 68 thus energizes magnet 35 and causes pawl 41 acting on ratchet 16 to move brush 17 one contact, also passes out on the trunk line to set up the trunk switch TS one contact, so that for every contact that brush 17 is set up, the brushes of the trunk switch are set up correspondingly. The construction of the trunk switch TS and the circuits which connect it with the dial operated impulse transmitter form no part of the present invention, but comprise the subject matter of a companion application of mine filed March 16th, 1911, Serial No. 614,948.

In Fig. 1, the arm 23 of the dial is set in the ninth hole (the first being 0), and the movable contact 27 rests on the corresponding contact 7. When the vibrating relay C has given eight impulses, contact 17 will rest on the same contact as the movable contact 27 and the brushes of the line switch will rest on the ninth set of contacts, a circuit now being established as follows, from battery *b*, wires 45^a, 45^c, 45^b, 45^c to brush 17 to contact 27, through wire 74 to winding of relay D, through wire 75 and wire 76, to contacts 51, 52, and wire 67 to ground, thus energizing relay D. The relay D on becoming energized attracts its contact 77 and breaks the connection between wires 68 and 70, thereby opening the connection from vibrating relay C to the trunk line and stopping the brushes of the trunk switch and connects wire 70 with wire 78 and through the medium of contacts 79 of relay E with wire 80, to winding of relay B, thence through wire 75, wire 76, contacts 51 and 52 to ground, which connects direct battery through contacts of relay B, wire 61, contact 81 of relay D, and wire 82, to wire 83 of trunk line, thereby shunting out resistance *R* and locks itself up by connecting its winding to battery through its own contact, by reason of its coils being energized

through wire 45^a, which holds its contact 45^a closed. Armature 77 now being attracted breaks connection of wire 70 from wire 68, preventing further impulses from being sent over the line from relay C.

If subscriber's line is busy, the circuit will be closed through his instrument and the battery current on the sleeve side of the trunk passing through subscriber's line and instrument comes back on tip of trunk, through wire 73, contact 72, wires 71 and 70, to contact 77 of relay D, through wire 78, contact 79, wire 80, thence to winding of relay B, thence through wires 75, 76, to contacts 51 and 52, thence to ground, thus energizing relay B which attracts its armature 75^a and lights lamp 84 through the following circuit: Battery current from wire 45^b passes to wire 84^a, thence to lamp 84, contact 75^a, wire 75, wire 76 to contacts 51, 52, wire 67 to ground. The lamp 84 being lighted indicates to operator that the line is busy; relay B also opens battery to vibrating relay C rendering it inoperative and preventing ringing on a busy line. A subscriber's line not being in use, brush 17 continues movement until it makes a contact with contact 28, when battery current from brush 17 flows to contact 28 through wire 28^a to relay E and through wire 28^b to contact 75^a of relay B, thence through wires 75, 76 and contacts 51 and 52 to ground. Relay E becoming energized locks itself up by closing its own contacts to battery from its winding through wire 45^c and also opens connection from wire 80 to relay B and connects ringing current to wires 78 and 70 and trunk line. The circuit for ringing which is thus made is from generator G, wire *g* to contact 79, wire 78, contact 77, wire 70, wire 71 to contact 72 and wire 73 of the trunk line, thence by any suitable circuits through the subscriber's instrument and back to generator G. Brush 17 continues in motion traveling across the several intervening contacts 7 until it reaches contact 29, when battery current from brush 17 passing to contact 29, through wire 29^a to coils of the restoring magnet F to ground, energizes coils F, which releases key 56. Releasing key 56 opens contact through release magnet 45 and relay 57. Release magnet 45 on becoming deenergized disengages pawls 41 and 43 from ratchet 16 and brush 17, drops back to normal position, also contacts of release magnet 45 being open, break ground circuit for relays B, E and D and restores everything to normal position. Relay 57 dropping back disconnects the impulse transmitter from trunk.

A brief summary of the operation is as follows: Upon pushing the button 56, relay 57 and release magnet 45 are energized and the latter starts the vibrating switch C which operates during the travel of brush

17 from the starting point. When brush 17 reaches the contact 27, relay D is energized and if line is busy, relay B will be energized, also lighting lamp 84. Upon brush 17 reaching contact 28, relay E is energized which starts the ringing current over the line which continues until brush 17 reaches contact 29, whereupon the key is automatically released by coils F and all parts are restored to normal position. If the lamp 84 indicates the trunk busy, the operator will pull the plug at key 56, which thereupon immediately restores the parts to normal position.

Fig. 6 is a diagrammatic view showing the dial member separated from the switch member. The construction of the two parts as separated is unchanged, while the contacts 7 are connected with the associated contacts 7, by wires *w*. Only a few of the wires *w* are shown, the rest being omitted for clearness of illustration.

What I claim is:

1. A dial, an indicator movable into various positions thereon, a switch member with stationary contacts in definite relation to the dial, a movable contact having definite relation to said indicator and movable into contact with any of said stationary contacts, a traveling brush adapted to travel along and contact with any of said stationary contacts, a magnet with means for advancing said brush one contact each time said magnet is energized, and means for intermittently energizing said magnet to move said brush to the contact on which said movable contact rests.

2. A dial, an indicator movable into various positions thereon, a switch member with stationary contacts in definite relation to the dial, three movable contacts having definite relation to said indicator and movable into contact with three correspondingly spaced stationary contacts, a traveling brush adapted to travel along and contact with any of said stationary contacts, a magnet with means for advancing said brush one contact each time said magnet is energized, means for intermittently energizing said magnet, and means for restoring said brush to normal position upon its reaching the third movable contact.

3. A dial, an indicator movable into various positions thereon, a switch member with stationary contacts in definite relation to the dial, three movable contacts having definite relation to said indicator and movable into contact with three correspondingly spaced stationary contacts, a traveling brush adapted to travel along and contact with any of said stationary contacts, a magnet with means for advancing said brush one contact each time said magnet is energized, means for intermittently energizing said magnet, means for restoring said brush to

normal position upon its reaching the third movable contact, a ringing circuit, and a relay operated to close the same during the travel of said brush from the second to the third movable contact.

4. A series of stationary contacts, a plurality of movable contacts movable into engagement with any of the stationary contacts, a traveling brush movable over the stationary contacts, a ratchet for operating said brush, a pawl for operating said ratchet, an operating magnet for actuating said pawl, a release magnet for releasing said pawl, and a vibrating relay connected with the operating magnet.

5. A dial with a series of holes, an indicating arm movable over the dial and provided with means for engaging any of said holes to retain the indicating arm in position, a switch member provided with a series of stationary contacts, a shaft operated by said indicating arm, a plurality of movable contacts carried by said shaft and movable into engagement with any of the stationary contacts, a brush adapted to travel along said stationary contacts, another shaft to carry said brush, means for intermittently actuating the latter shaft in one direction, and means for moving the latter shaft in reverse direction when said actuating means is released.

6. A dial, an indicating arm movable over the dial, means for detachably holding the indicating arm in position on the dial, a series of movable contacts operated by said indicating arm and movable into engagement with any of the stationary contacts, a brush movable across the stationary contacts, a shaft carrying said brush, a ratchet wheel on said shaft, a pawl for operating said ratchet, an operating magnet for actuating said pawl, a release magnet for releasing said pawl, and spring means for restoring said ratchet, shaft and brush to normal position when said pawl is released.

7. A dial, an indicating arm movable over the dial, a plurality of movable contacts operable by the indicating arm over the stationary contacts, each of said movable contacts having a flange at its inner end, a plurality of wipers engaging the respective flanges, a brush rotatable over the stationary contacts, a shaft carrying said brush, an operating magnet with means for actuating said brush in one direction, a release magnet for releasing said actuating means, and

means for restoring said brush to normal position when the actuating means is released.

8. In combination, two terminals at least one of which is rotatable to alter the distance between said terminals, a member movable from one terminal to the rotatable terminal, means for moving said member, and means coacting with said member for producing a definite number of electric impulses corresponding to the distance between said points during the movement of said member toward the variable terminal.

9. In combination, means including a member movable through an arc for producing a number of electric impulses in definite relation to its travel, a contact rotatably adjustable to various positions in said arc, and means for stopping said impulses when said member reaches and makes contact with said adjustable contact.

10. In combination, means including a member movable through an arc for producing a number of electric impulses in definite relation to its travel, a contact adjustable to various positions in said arc, means for stopping said impulses when said member reaches and makes contact with said adjustable contact, another contact adjustable beyond the first contact, and means for maintaining a ringing current during the travel of said member from the first mentioned contact to the latter contact.

11. In combination, means including a member movable through an arc for producing a number of electric impulses in definite relation to its travel, a contact adjustable to various positions in said arc, means for stopping said impulses when said member reaches and makes contact with said adjustable contact, another contact adjustable beyond the first contact, means for maintaining a ringing current during the travel of said member from the first mentioned contact to the latter contact, and means operating when the member reaches the latter contact for returning said member to normal position.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 18th day of January, 1911.

CHARLES R. AUSTIN.

In presence of—

G. T. HACKLEY,
FRANK L. A. GRAHAM.