

No. 673,553.

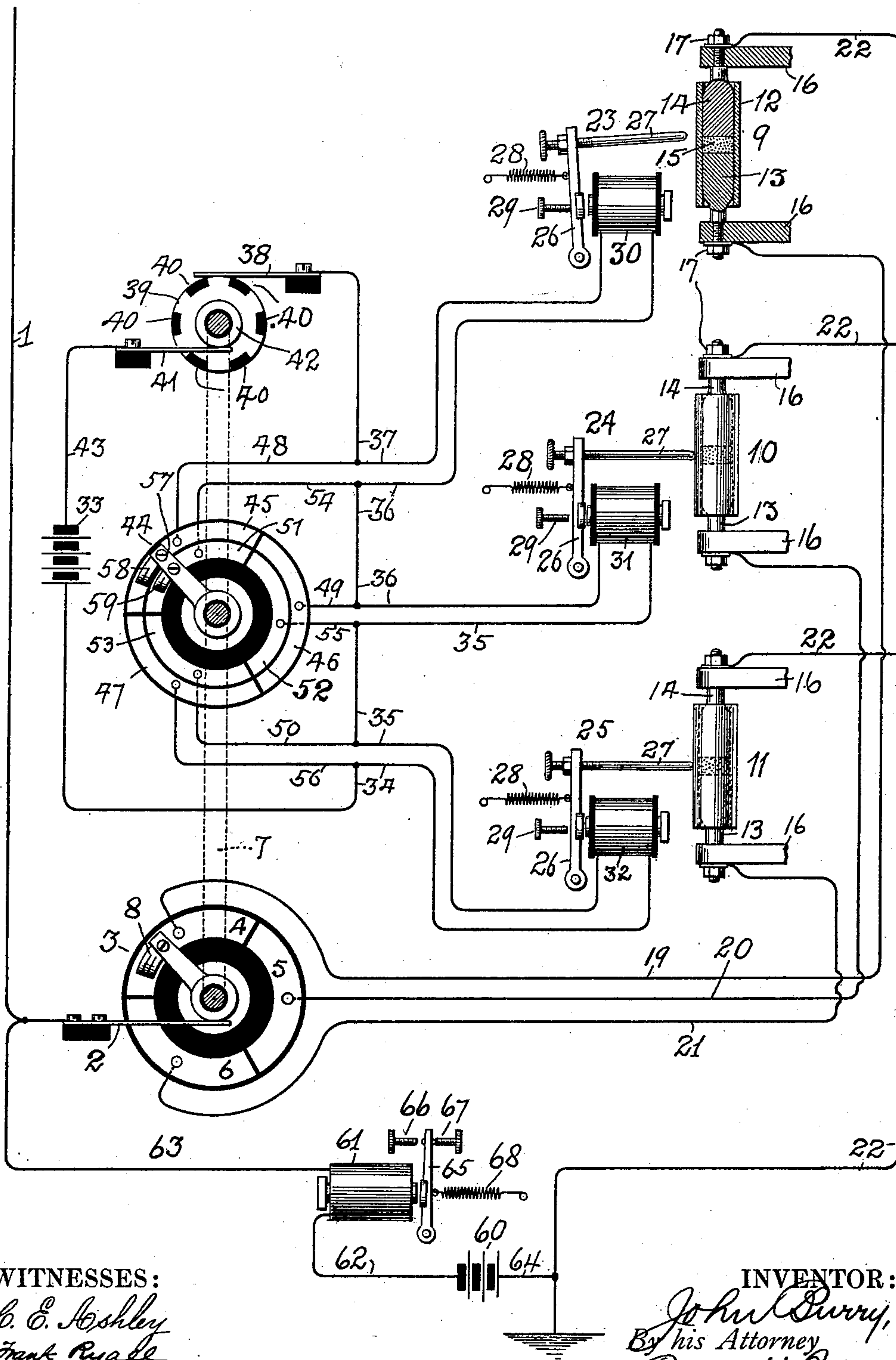
Patented May 7, 1901.

J. BURRY.

APPARATUS FOR USE IN WIRELESS TELEGRAPHY.

(Application filed Sept. 9, 1899.)

(No Model.)



WITNESSES:

*C. E. Ashley*  
*Frank Ryall*

INVENTOR:

*John Burry*  
By his Attorney  
*Richard W. Parkley*



# UNITED STATES PATENT OFFICE.

JOHN BURRY, OF FORT LEE, NEW JERSEY.

## APPARATUS FOR USE IN WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 673,553, dated May 7, 1901.

Application filed September 9, 1899. Serial No. 729,894. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BURRY, a citizen of the United States, and a resident of Fort Lee, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Apparatus for Use in Wireless Telegraphy, of which the following is a specification.

The present invention relates to apparatus for use in the art of transmitting and receiving signals by means of oscillations or manifestations of the ether, whether on sea or on land, and more especially to apparatus for use at the receiving-station.

In Letters Patent of the United States, dated the 13th day of July, 1897, bearing No. 586,193, and granted to Guglielmo Marconi, a complete system of "wireless telegraphy," popularly so called, is disclosed, wherein several forms of receiving apparatus are described, and in United States Letters Patent No. 627,650, dated June 27, 1899, and granted to said Marconi, are shown modified forms of the receiving apparatus. In the apparatuses shown and described in said Letters Patent and in all improvements thereon with which I am acquainted it is not possible to use the ordinary "dot-and-dash" or Morse system of signaling, owing to the fact that the contact or contacts employed are automatically restored to their normal condition of high resistance as soon as a circuit of a given strength is once established through them. From this it follows that several vibrations of the Morse receiver represent a dot and a greater number of such vibrations represent a dash, though of course at the sending-station the key is (or may be) operated as in ordinary telegraphy.

One object of the present invention is to cause the vibrations of the armature-lever of the Morse instrument (relay or sounder) at the receiving-station to harmonize with the key movements at the sending-station—that is, the movements of the armature-lever of the receiving-relay or sounder will be practically synchronous with the movements of the sending-key or a dot sent will be a dot at the receiver, and so, also, for a dash.

Many forms of imperfect electrical contacts have been proposed or used, some of which are self-recovering or self-restoring to a normal

condition of poor conductivity, while some are quick and some are slow to recover said condition. Others are quick in recovering for a time and then lose that power in a greater or lesser measure, but may be restored by rest or by appropriate methods of treatment.

One object of the present invention is to provide intervals of time during which the imperfect electrical contacts shall be wholly cut off from the collector or interceptor of the oscillations or manifestations of the ether and during which intervals of time the said contacts may be restored to their normal condition of poor conductivity (or the reverse) either by self-recovery or by means appropriate to the particular kind of contact in use.

Other objects will appear hereinafter during the description of the invention.

In the said Letters Patent to Marconi are described several forms of receiving apparatus, one as having complete metallic local circuits, another as having the terminals of the metallic part of the local circuit, one in the air and the other in the earth or water, a third as having both metallic terminals in earth or water, and a fourth as having the receiving apparatus connected with the secondary of an induction-coil. The apparatus forming the subject-matter of this application may be used in each of the cases just above referred to, and this statement should be borne in mind during the description hereinafter given of a specific instance or application of the invention and also in the construction of the claims.

According to the present invention a number of imperfect electrical contacts are arranged in multiple at the receiving-station. Means are provided for progressively switching less than the whole number of said contacts into and out of the local circuit, whereby each of said contacts is not in circuit for portions of the time and during which intervals of time it may be restored to normal condition by electromagnetic means or by means controlled by electromagnets. By preference but one imperfect electrical contact is in circuit at any one time, and also at least three contacts are used at the receiving-station. Circuit-completing connections are arranged



to complete the circuit through the conductor and the contact or contacts with which it may be connected momentarily.

In order to translate the oscillations or manifestations of the ether into dot-and-dash signals for ordinary telegraphy, a relay or sounder and a battery are joined in series with each other and with said conductor and said circuit-completing connections. The self-induction of the magnet-coils prevents the oscillations or etheric manifestations from being short-circuited through the relay and battery. The arrangements are such that the battery-current goes through the said electrical contacts whenever these are in circuit with the battery and have had their resistance reduced by the action of oscillations set in motion at the distant sending-station; but the resistance through the coils of the magnet of the relay or sounder, the battery, and an unacted-upon contact (or contacts) is so great as practically to have "open circuit," or the imperfect electrical contacts may be arranged to increase their resistance under the influence of the oscillations or manifestations of the ether, so as to open instead of closing the circuit through the relay or sounder. In the first case the magnet is not strong enough to attract the armature-lever to itself, while in the second case the magnet is weakened to release the armature-lever. In the first case the battery-current becomes strong enough to cause the magnet to attract the armature-lever and so to operate the line or other circuit once the oscillations reduce the resistance of a contact. The receiving instrument is intended to be operated at such a rate of speed as will secure that more than one contact (in the preferred arrangement) will be switched in during the sending of a dot; but the interval between the cutting out of one contact and the cutting in of the next is so slight that the magnet does not have time to become discharged sufficiently to release (or reattract) the armature-lever. Of course when a dash is transmitted and received the same statement holds true for the greater number of contacts so cut out and in.

The preferred form of the invention is illustrated in the accompanying drawing, forming part hereof.

The reference 1 indicates a conductor having one end connected to a brush 2. The other end of said conductor may be connected to or may form a collector for the oscillations or manifestations of the ether.

3 is a sunflower having three conducting-segments 4 5 6, insulated from each other and from the shaft 7.

8 is a trailer-arm fast to but insulated from the shaft 7 and provided with a hub, upon which the brush 2 bears.

9 10 11 are three imperfect electrical contacts, one being shown in section. The segments 4, 5, and 6 are connected electrically each with a different one of said electrical contacts 9 10 11. Each of the said contacts

comprises a tube 12, of insulating material, as glass, two plugs 13 14, of metal, of a size to fit the tubes and sealed therein and separated from each other by a space. In the said space is placed metallic powder or grains 15, loose and in such a condition that when the tube 12 is tapped or jarred or shaken they may move. The plugs 13 14 are provided with reduced end portions, beyond which is a still further reduced portion provided with screw-threads and adapted to pass through perforations in the standards or bearers 16 and to which they are firmly secured by nuts 17. The segment 4 is connected with the contact 9 by a wire 19. The segment 5 is connected with the contact 10 by a wire 20, and the segment 6 is connected with the contact 11 by a wire 21, the connection in each case being made with a plug 13 of the corresponding contact. The circuits through the contacts 9 10 11 are completed by branches of a return-wire 22, the said branches being connected with the plugs 14 of the said contacts. In the instance shown the circuit-completing wires 22 are grounded; but, as above intimated, the local circuit may be otherwise completed.

From the described construction it will be seen that the trailer 8 during the rotations of the shaft 7 successively or progressively connects the segments 4, 5, and 6 with their corresponding contacts and that each contact is in circuit with conductor 1 for substantially one-third of the time.

The devices shown in the drawing for restoring the imperfect electrical contacts to their normal condition are adapted to the particular form of contact employed and comprise vibratory tappers 23 24 25, each comprising a pivoted arm 26 and adjustable hammer 27, connected thereto by screw-threads and lock-nuts and springs 28 for drawing the tappers against the stops 29. In order to cause the tappers to strike the corresponding contacts, there are provided electromagnets 30 31 32, and the tapper-arms 26 are provided with armatures for coaction with said magnets. In order to energize the said magnets, a battery and connections are provided, the said connections including an automatic circuit-breaker, and also means are provided for short-circuiting each electromagnet whenever the corresponding imperfect electrical contact is in circuit with the conductor 1 through the medium of the brush 2, trailer 8, sunflower-segment, and connection.

33 is a battery having one pole connected with magnet 32 by the conductor 34, and from the magnet 32 the circuit passes by conductor 35 to the magnet 31, and from the magnet 31 by the conductor 36 to the magnet 30, and from the magnet 30 by the conductor 37 to a brush 38, which bears upon a rotating disk 39, which is provided with a number of insulated segments 40. A brush 41 bears upon a hub 42 of the disk 40 and is connected with the other pole of the battery 33 by conductor 43. The disk 40 and hub 42 are



insulated from but rotate with the shaft 7. The electrical connections between the battery and the magnets as thus described would cause each magnet to be energized every time the circuit was completed through the automatic circuit-breaker. In order to cut out any electromagnet at the time its corresponding contact is in circuit with the conductor 1, as aforesaid, there is provided a sunflower 44, comprising two concentric rows of three segments each, insulated from each other and from the shaft 7. The segments 45, 46, and 47 of the outer row are connected, respectively, with the conductors 37, 36, and 35 by wires 48, 49, and 56, each connection being made at the corresponding sides of the electromagnets 30 31 32, while the segments 51, 52, and 53 of the inner row of the sunflower 44 are respectively connected with the conductors 36, 35, and 34 by wires 54 55 50 at the corresponding sides of the said magnets 30, 31, and 32. An arm 57 is attached to but is insulated from the shaft 7 and is provided with two brushes 58 and 59, respectively, bearing upon the outer and inner rows of segments of the sunflower 44 and electrically connecting said segments by pairs, as indicated in the drawing, in which the magnet 30 is short-circuited and so does not attract the arm 26, while at the same time the trailer 8, the segment 4, and the conductor 19 connect the conductor 1 with contact 9. The electromagnets 31 and 32 are in connection, however, with the battery 33 in condition to be energized and deenergized by the automatic circuit-breaker. As soon as the trailer 8 passes to the segment 5 and the trailer 57 to the segments 46 and 52 the magnet 30 is thrown into circuit with the battery 33 and the magnet 32, while the magnet 31 is short-circuited or cut out, and when the trailer 8 passes to the segment 6 the trailer 57 passes to the segments 47 and 53, short-circuiting the magnet 32 and restoring magnet 31 to the battery-circuit to be energized along with magnet 30 as the circuit-breaker makes and breaks the circuit. The automatic circuit-breaker shown is adapted to twice make and twice break a circuit while each electromagnet is in circuit with the battery, thus securing that two taps upon each electrical contact shall be had while the said contact is not in circuit with the conductor 1.

In order to adapt the devices thus far described to the translation of the oscillations of the ether into dot-and-dash or the ordinary telegraphic code, there is provided a battery 60 and a relay or sounder, whose magnet-coils 61 are connected with one pole of the battery by a conductor 62 and with the conductor 1 by a conductor 63, and the other pole of the battery is connected with the circuit-completing wire 22 by a conductor 64. The armature-lever 65 of the relay or sounder vibrates between the contacts or stops 66 67, being drawn away from the electromagnet 61 by spring 68 whenever the circuit through

the magnet 61, battery 60, and an imperfect electrical contact is broken, or, rather, whenever the imperfect electrical contact is in its condition of poor conductivity, at which time the magnet 61 is practically out of circuit.

In the operation of the devices shown in the drawing the trailers 8 and 57 and the circuit-breaker or switch 39 are rotated by the shaft 7 at, say, two thousand turns per minute. The trailer 8 cuts in and cuts out the contacts 9 10 11 one by one, while trailer 57 short-circuits the magnets 30 31 32 one at a time, and the automatic switch twice cuts in and twice cuts out the electromagnets while they are in circuit with the battery 33, thus causing two blows upon each of the contacts 9 10 11 while it is not in circuit with the conductor. The etheric oscillations started at a distant or sending station are collected, intercepted, or picked up at the receiving-station in any suitable way and conveyed by the wire 1 to the brush 2, and thence pass through shaft 7 and trailer 8 to whatever segment or segments of the sunflower 3 the trailer may be in contact with or over which it may pass, while the production of the oscillations may last and so pass to the imperfect electrical contact or contacts in succession and to earth or other return. The passage of the oscillatory current through the contacts 9 10 11 decreases the resistance thereof to such an extent that the current through the relay becomes strong enough to cause the lever 65 to be drawn over against stop or contact 66, and the lever 65 there remains as long as the sending-key is held down to cause sparking or oscillations at the sending-station, notwithstanding the fact that the trailer 8 may pass from one segment to another during such time. Whenever the key at the sending-station is released or opened the oscillations cease, and at the receiving-station the imperfect contacts, which are continuously restored to their normal conditions by the tapping of pins 27, break the circuit through the relay practically, whereupon the spring 68 draws the lever 65 over against contact or stop 67. From the foregoing it will be seen that the length of time that the armature-lever 65 remains in contact with the stop or contact point 66 depends upon the time the key at the sending-station is held closed, whence it is obvious that signals may be sent in the way common in ordinary telegraphy by dot and dash and that the apparatus described translates the oscillations into dot and dash at the receiving-station.

While I have shown and described three imperfect electrical contacts at the receiving-station, my invention is not limited to the use of this number, nor is it limited to the use of imperfect electrical contacts of the kind heretofore described, for it is obvious that my system of using a number of such contacts in alternation—that is, of using less than the whole number and of progressively changing those in use and disuse—may be used in the



case of contacts which are self-restoring without departing from the scope of my invention. Also, my system may be used in order to open a circuit instead of closing one, (the case illustrated in the drawing and hereinbefore described,) in which case the contacts would increase instead of decreasing their resistance under the influence of the oscillations of the other.

Of course suitable capacities or condensers may be or are used wherever the situation permits or demands them; but I have not deemed it necessary to show them.

What is claimed is—

1. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting less than the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, and electromagnetically-controlled means for restoring each contact to normal condition while it is not in circuit with said conductor, substantially as described.

2. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for progressively connecting and disconnecting less than the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, and electromagnetically-operated tappers for restoring each of said contacts to normal condition while it is not in circuit with said conductor, substantially as described.

3. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting said contacts with and from said conductors one by one, circuit-completing connections from said contacts, and electromagnetically-controlled means for restoring each contact to normal condition while it is not in circuit with said conductor, substantially as described.

4. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for progressively connecting and disconnecting said contacts one at a time with and from said conductor, circuit-completing connections from said contacts, an electromagnetically-operated tapper for and adjacent each of said contacts, a battery, and means for connecting and disconnecting said battery with and from the electromagnets for said tappers while the corresponding contact is not in circuit with said conductor, substantially as described.

5. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting less than

the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-operated device for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, connections from said battery to the electromagnets of said restoring devices, and means for short-circuiting each electromagnet while the corresponding contact is in circuit with said conductor, substantially as described.

6. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts, means for connecting and disconnecting said contacts one by one with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-controlled device for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, a double sunflower, a trailer for connecting adjacent inner and outer sunflower-segments, a circuit-breaker, wires joining said battery, circuit-breaker and electromagnets in series, and electric connections between each pair of adjacent inner and outer sunflower-segments and said wires at opposite sides of the corresponding electromagnet, whereby each of said magnets is short-circuited while the corresponding imperfect electrical contact is in circuit with said first-named conductor, substantially as described.

7. In wireless telegraphy and the like, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for connecting and disconnecting said contacts one by one with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-operated tapper for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, a double sunflower, a trailer for connecting adjacent inner and outer sunflower-segments, a circuit-breaker and electromagnets in series, and electric connections between each pair of adjacent inner and outer sunflower-segments and said wires at opposite sides of the corresponding electromagnet, whereby each of said magnets is short-circuited while the corresponding imperfect electrical contact is in circuit with said first-named conductor, substantially as described.

8. In wireless telegraphy and the like, the combination of a conductor, three imperfect electrical contacts restorable to normal condition by shaking or jarring, means for connecting and disconnecting said contacts one by one with and from said conductor, circuit-completing connections from said contacts, a sunflower having two concentric rows of three segments each, a trailer for electrically connecting adjacent inner and outer segments, an electromagnet for and adjacent each of



said contacts, a tapper at each of said magnets for tapping the corresponding contact, a circuit-breaker, a battery, wires connecting said magnets, circuit-breaker and battery in series, and electric connections between each pair of said inner and outer sunflower-segments and the said wires at opposite sides of the corresponding electromagnet, whereby each magnet is short-circuited while the corresponding imperfect electrical contact is in circuit with said first-named conductor, substantially as described.

9. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting less than the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, and electromagnetically-controlled means for restoring each contact to normal condition while it is not in circuit with said conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

10. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for progressively connecting and disconnecting less than the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, and electromagnetically-operated tappers for restoring each of said contacts to normal condition while it is not in circuit with said conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

11. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting said contacts with and from said conductors one by one, circuit-completing connections from said contacts, and electromagnetically-controlled means for restoring each contact to normal condition while it is not in circuit with said conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

12. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for progressively connecting and disconnecting said contacts one at a time with and from said conductor, circuit-completing connections from said contacts, an electromagnetically-operated tapper for and adjacent each of said contacts, a battery, and means for connecting and disconnecting said battery with and from

the electromagnets for said tappers while the corresponding contact is not in circuit with said conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

13. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts, means for progressively connecting and disconnecting less than the whole number of said contacts with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-operated device for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, connections from said battery to the electromagnets of said restoring devices, and means for short-circuiting each electromagnet while the corresponding contact is in circuit with said conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

14. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts, means for connecting and disconnecting said contacts one by one with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-controlled device for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, a double sunflower, a trailer for connecting adjacent inner and outer sunflower-segments, a circuit-breaker, wires joining said battery, circuit-breaker and electromagnets in series, and electric connections between each pair of adjacent inner and outer sunflower-segments and said wires at opposite sides of the corresponding electromagnet, whereby each of said magnets is short-circuited while the corresponding imperfect electrical contact is in circuit with said first-named conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.

15. In wireless telegraphy, the combination of a conductor, a number of imperfect electrical contacts restorable to normal condition by shaking or jarring, means for connecting and disconnecting said contacts one by one with and from said conductor, circuit-completing connections from said contacts, an independent electromagnetically-operated tapper for restoring each contact to normal condition while it is not in circuit with said conductor, a battery, a double sunflower, a trailer for connecting adjacent inner and outer sunflower-segments, a circuit-breaker and electromagnets in series, and electric connections between each pair of adjacent inner and outer sunflower-segments and said



wires at opposite sides of the corresponding electromagnet, whereby each of said magnets is short-circuited while the corresponding imperfect electrical contact is in circuit with  
5 said first-named conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described.  
10 16. In wireless telegraphy, the combination of a conductor, three imperfect electrical contacts restorable to normal condition by shaking or jarring, means for connecting and disconnecting said contacts one by one with and  
15 from said conductor, circuit-completing connections from said contacts, a sunflower having two concentric rows of three segments each, a trailer for electrically connecting adjacent inner and outer segments, an electro-  
20 magnet for and adjacent each of said contacts, a tapper at each of said magnets for tapping

the corresponding contact, a circuit-breaker, a battery, wires connecting said magnets, circuit-breaker and battery in series, and electric connections between each pair of said  
25 inner and outer sunflower-segments and the said wires at opposite sides of the corresponding electromagnet, whereby each magnet is short-circuited while the corresponding imperfect electrical contact is in circuit with  
30 said first-named conductor, with a relay or sounder, and a battery electrically connected in series with each other and with said first-named conductor and said circuit-completing connections, substantially as described. 35

Signed at New York, in the county of New York and State of New York, this 8th day of September, A. D. 1899.

JOHN BURRY.

Witnesses:

R. W. BARKLEY,  
FRANK RYALL.