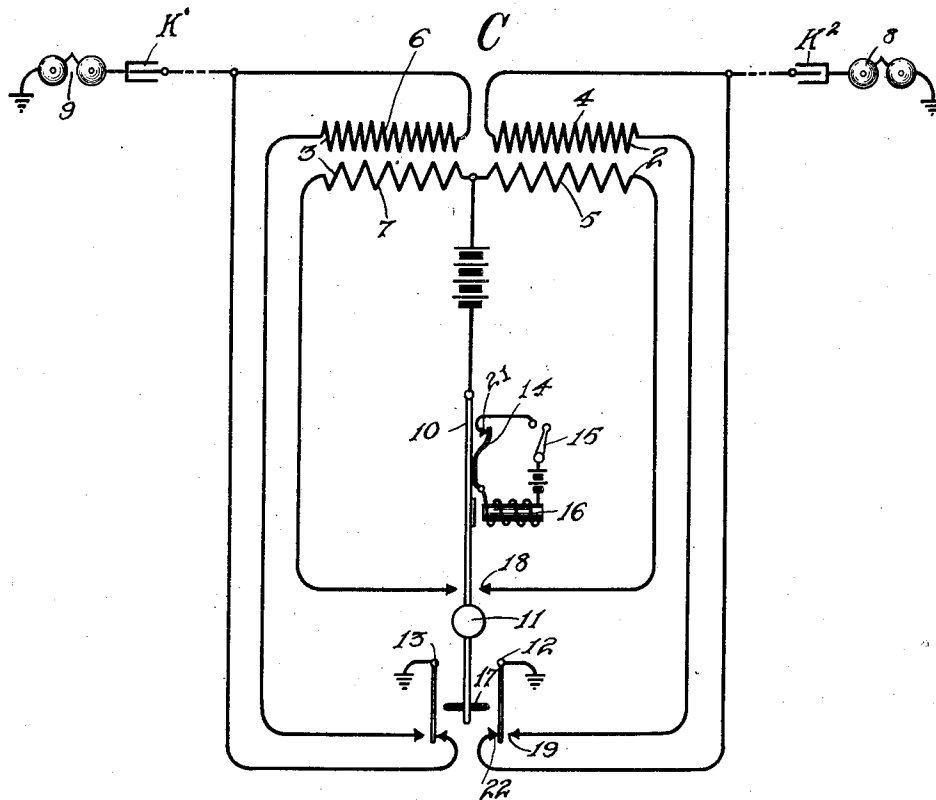


H. D. CURRIER.
POLE CHANGER.
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Witnesses:

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POLE-CHANGER.

1,330,059.

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To all whom it may concern:

Be it known that I, HIRAM D. CURRIER, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Pole-Changers, of which the following is a specification.

My invention relates to apparatus for use in automatically converting the current of a battery or other source into pulsating current suitable for use, for example, in operating harmonic or tuned bells or ringers, such as the bells or ringers of a telephone system.

Generally stated, the object of my invention is the provision of improved means for operating ringers or bells. Special objects of my invention are, the provision of a novel circuit arrangement whereby pulsating current may be used to operate tuned or harmonic bells; the provision of a mechanism having an operating circuit which is entirely independent of and distinct from the generating circuit; the provision of simplified pole changing mechanism for producing pulsating current and for discharging the condenser at a substation between pulsations whereby the effect produced is equivalent to that produced by alternating current; and the provision of certain details and features of improvement and combinations tending to increase the general efficiency and serviceability of a mechanism of the above character.

To the foregoing, and other useful ends, my invention consists in matters hereinafter set forth and claimed.

Referring to the accompanying drawing, I have shown diagrammatically the circuit arrangement of a current generator device embodying the principles of my invention. The mechanical structure of the mechanism embodying the circuit arrangement of my invention may be of any of the well-known types, such as shown in United States Letters Patent No. 1,058,009, to A. H. Weiss, issued April 1st, 1913. As pole changers of this character are well-known in the art and as my invention relates more to the circuit arrangement of the same, it is thought unnecessary to further describe in detail the mechanical structure of the said pole changer. The pole changer C, as represented, comprises a tuned reed or pendulum 10 provided with a weighted member 11 adapted to be adjusted vertically along the tuned reed

so that the frequency of the vibrating reed may be readily varied. Attached to the member 10 is a circuit interrupter 14 adapted to open and close the circuit of the vibrating magnet 16. The magnet 16 provides motive power to keep the tuned reed oscillating as long as its local operating circuit is closed. Attached to the reed or pendulum member 10, is a buffer 17 adapted to operate the contacts 12 and 13.

A pair of transformers or induction coils 2 and 3, each comprising a primary and a secondary winding, are shown associated with the pole changing mechanism. One terminal of the secondary winding 4 of the transformer 2 is shown connected directly to a condenser K² and through to a harmonic or tuned bell 8. One terminal of the secondary winding 6 of the induction coil 3 is shown connected directly to a condenser K¹ and then to a harmonic or tuned bell 9. However, it is to be understood that I have shown the tuned bells connected directly to the secondary winding of the induction coils for illustration purposes only, for in actual practice one terminal of the secondary windings is connected direct to bus bars on the exchange power board. The current from the bus bars then is carried through exchange equipment to the line of the called subscriber and finally to the condenser and bell located at the called subscriber's substation. In systems employing party line service it is customary to tune the bells at each substation to respond to a certain frequency of current and to no other. I therefore provide a different tuned current generator for each differently tuned bell connected to the party line. While I have shown a battery for furnishing the motive power to the vibrating magnet which operates the tuned reed separate from the battery connected to the primary windings of the induction coils or transformers yet it is to be understood that the same battery may be used for both purposes.

Having described in general the apparatus embodied in my invention, I will now describe more in detail its operation.

When the manual switch 15 is closed, a local operating circuit is closed for vibrating magnet 16. The vibrating magnet 16, upon energizing, closes a circuit through the primary winding 5, of the induction coil 2, traced from the positive pole of battery 110

through the primary winding of said induction coil, contact 18, member 10, back to the opposite pole of battery. At the same time that this circuit is closed through the primary of the induction coil, the buffer 17 operates to close contacts 12 and 19 thereby connecting ground to one terminal of the secondary winding 4. Upon the closure of the above traced circuit through the primary winding 5, an impulse is induced in the secondary winding 4, extending from the secondary winding through the harmonic bell 8 to ground and through contacts 19 and 12 to ground thus charging the condenser K^2 and causing the magnet of the harmonic bell to attract its armature in one direction. The magnet 16, having its local energizing circuit opened at contacts 21 and 14, allows the pendulum 10 to swing back to the left thus allowing contact 12 to disengage contact 19 and to engage contact 22 thereby connecting ground direct to one terminal of the condenser K^2 thereby discharging the condenser K^2 and causing the magnet of the harmonic bell to attract its armature in the opposite direction. The pendulum 10 upon reaching the extent of its travel again closes contacts 21 and 14, thereby again closing an energizing circuit through the vibrating magnet 16 and causing the pendulum to be carried to the right. The above operation is repeated for each oscillation of the pendulum 10 thereby transmitting impulses at a certain frequency to the harmonic bell 8 and at the same time short-circuiting the condenser K^2 and harmonic bell 8 through ground, between each oscillation, thereby discharging the condenser K^2 . It will be noted that the apparatus associated with the induction coil 3 is similar to the apparatus associated with the induction coil 2 and operates in the same manner to transmit operating current to the tuned bell 9. By reversing the flow of the current in the primary winding the induced impulses in the secondary winding may be made of opposite polarity. That is, either negative or positive pulsating current may be provided.

It is thus seen that I have provided a pole changer having two separate current generating circuits and which has an operating circuit entirely separate from the generating circuits. While I have only shown one specific circuit arrangement, yet it is to be understood that, I do not wish to limit myself to the specific arrangement shown as many changes and modifications will readily suggest themselves to one skilled in the art, therefore I wish to cover all that comes within the spirit and scope of the appended claims.

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

1. In a signaling system, a tuned signal

receiving device, a condenser associated with said device, means for supplying pulsating current to said device, and means for short-circuiting said device and condenser between such pulsations whereby the joint effect of said pulsating current and said short circuiting causes the said tuned device to be operated.

2. An electric signaling system including a current generating device and a polarized bell, said current generating device being adapted to inductively connect pulsations of current of one character to operate the armature of said bell in one direction and to conductively interpose grounded impulses between said pulsations to operate the said bell armature in the opposite direction.

3. In a telephone system, a tuned polarized signal receiving device, a current producing means for generating current to operate said device, the current produced by said device including induced pulsations of current of one character adapted to operate a movable member of said tuned polarized receiving device in one direction and grounded impulses interposed between said pulsations of current for operating said movable member in the opposite direction.

4. A signaling system including a signal receiving device, a vibratory member, a transformer having a primary and a secondary winding, a circuit controller operated by said vibratory member and connected in circuit with said primary winding for intermittently closing a circuit through said primary winding thereby causing said secondary winding to deliver pulsating current at a predetermined frequency, a second circuit controller operated by said vibratory member and adapted to conductively supply grounded impulses, and means for connecting said pulsating current and said grounded impulses to said signal receiving device thereby operating the same.

5. A signaling system including a polarized device provided with an armature, a condenser connected in circuit with said polarized device, a vibratory member, a transformer provided with a primary and a secondary winding, means controlled by said vibratory member for intermittently closing a circuit through said primary winding thereby causing said secondary winding to deliver pulsations of current to said polarized device to operate its armature in one direction, and means controlled by said vibratory member for discharging said condenser to operate the armature of said polarized device in the opposite direction.

6. An electrical signaling system including a polarized device provided with an armature, a current generating device, said current generating device being adapted to

produce and inductively connect impulses of current of one character to said polarized device to operate the armature thereof in one direction, and to conductively inter-
5 pose grounded impulses between said pulsations to operate the armature of said polarized device in the opposite direction.

7. An electrical signaling system including a polarized device provided with an armature, a current generating device, said
10 current generating device being adapted to inductively connect pulsations of current of one character to operate the armature of said polarized device in one direction and to conductively short circuit said polarized de-
15 vice between pulsations to operate the armature of said polarized device in the opposite direction.

8. In a signaling system, a polarized device provided with an armature, a condenser connected in circuit with said polarized device, a current generating device for supplying pulsating current to said polarized device to operate the armature thereof in
20 one direction, and means for operating the said current generating device to discharge said condenser through said polarized device between the pulsations of current to operate the armature thereof in the opposite
25 direction.

9. A signaling system including a polarized device provided with an armature, a

vibratory member, a transformer provided with a primary and a secondary winding, means controlled by said vibratory member
35 for intermittently closing a circuit through the primary winding of said transformer thereby causing said secondary winding to transmit pulsations of current to said polarized device to operate its armature in one
40 direction, and means controlled by said vibratory member for short circuiting said polarized device between said pulsations of current to cause it to operate its armature in the opposite direction.

10. A signaling system including a polarized device provided with a movable member, a condenser connected in circuit with said polarized device, a current generating device for supplying pulsating current
50 to said polarized device to operate the movable member thereof in one direction, and means controlled by said current generating device to discharge said condenser through said polarized device between the pulsations
55 of current to operate the movable member thereof in the opposite direction.

Signed by me at Chicago in the county of Cook and State of Illinois, in the presence of two witnesses.

HIRAM D. CURRIER.

Witnesses:

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WM. BERGHAHN.