July 2, 1935. J. N. McTWIGGAN 2,006,363

ALTERNATING CURRENT BELL

Filed April 29, 1931

Fig. 1.

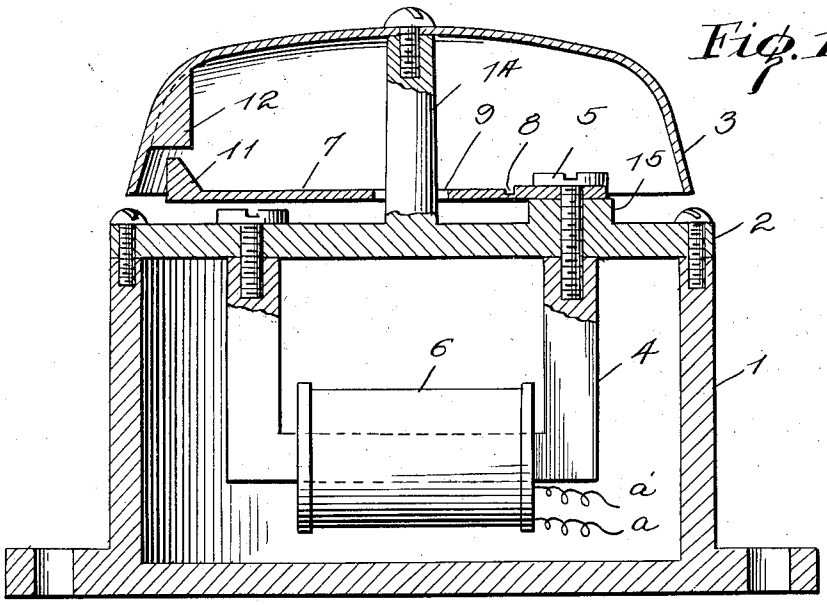


Fig. 2.

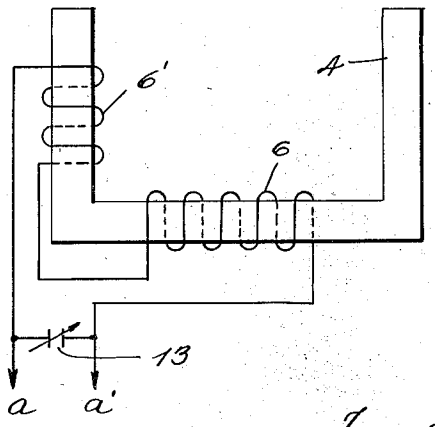
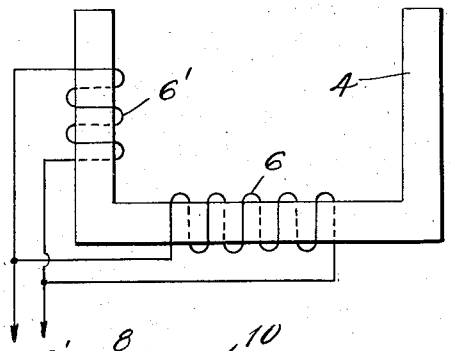


Fig. 3.



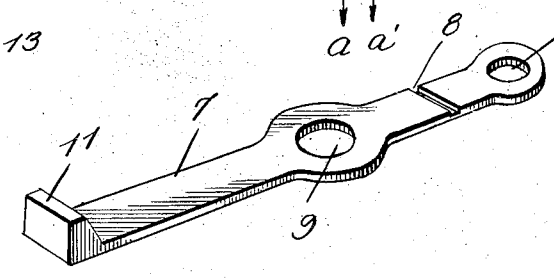


Fig. 4.

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ALTERNATING CURRENT BELL

James N. McTwiggan, United States Navy

Application April 29, 1931, Serial No. 533,745

1 Claim. (Cl. 177—7)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates broadly to signaling, and more particularly to a resonant reed device for operation in signaling circuits employing an alternating or an intermittent source of electromotive force.

One of the objects of this invention is to provide an electrically excited resonant reed device of simplified design which is of rugged construction and capable of handling a relatively large amount of power and yet is electrically sensitive.

Another object of the invention is to provide a moisture proof vibrating reed device particularly suitable for marine use, in which the electrical windings are encased and in which the vibrating reed is actuated on the exterior of the case by means of magnetic paths through the case.

Another object of the invention is to provide an electrically excited reed device capable of being vibrated by a source of alternating or pulsating electromotive force at the same frequency as the source of electromotive force or any submultiple or harmonic thereof.

Another object of the invention is to provide an electrically excited vibrating device requiring no circuit making and breaking device, and one that may be adjusted to operate from sources of potential of various values.

Another object of the invention is to provide an alternating current excited vibrating device suitable for actuating at a characteristic frequency the striker of an electric bell or buzzer or for vibrating a tympanum or the like.

Other and further objects of the invention will be understood from the specification hereinafter following by reference to the accompanying drawing forming a part of the specification, in which:

Figure 1 is a view partially in cross section showing the invention as embodied in a gong bell;

Figures 2 and 3 diagrammatically illustrate modifications of the coil structure;

Figure 4 is a perspective view of the vibrating reed element.

Referring to the drawing in detail, the bell case which is preferably of non-magnetic material is represented by reference character 1. The cover of non-magnetic material is shown at 2. The bell gong 3 is mounted on a post 14 extending from the center of cover 2. A U-shaped laminated soft steel core is shown at 4 mounted to the cover 2 by means of magnetic metal screws 5. The core 4 need not, however, be laminated in small low frequency bells. Carried on the laminated steel core 4 is one or more exciting coils 6 to whose terminals *a*—*a'* the pulsating or alternating source of electromotive force is connected. Numeral 7 represents the vibrating reed element which is attached at one end to the upstanding boss 15 provided on the cover and magnetically connected to one end of the U-shaped laminated core 4 by means of the screw 5 extending through aperture 10 and through a hole provided in the boss 15. The free end of the reed 7 is placed adjacent to the other end of the laminated core 4 which may if desired be polarized. The reed 7 is provided near its fixed end with a portion 8 of reduced cross section about which the free end pivots. Near the center of the reed 7 is provided an aperture 9 through which the post upstanding from the center of the cover is permitted to pass. Carried on the free end of the reed 7 is an enlarged portion 11 constituting the striker. The gong 3 is provided with a lug 12 arranged adjacent to the striker 11 to be struck thereby when the reed 7 is set into vibration.

Referring to the modification shown in Figures 2 and 3, 6' is a second winding similar to winding 6 arranged on one of the legs of the core 4. In Figure 2 this additional winding is shown connected in series with the winding 6 while in Figure 3 this winding is connected in parallel with winding 6. Other and additional windings similar to 6' of selected sizes may be provided for the other leg of the core or there may be several such windings on each leg thereof connected in series, parallel or in series parallel either aiding or in part opposing each other. By making the windings in sections as 6, 6', etc., the impedance may be regulated to adapt the device for use with various voltages and frequencies or to tune the device to electrical resonance with an associated condenser 13 connected in parallel with the windings. Similarly condensers can be connected in parallel with the windings 6 and 6' in Figures 1 and 3.

The electrical energy supply which is connected at *a*—*a'* may have an alternating electromotive force of pure sine wave form which is most desirable. However, in many cases, it may be distorted by harmonics and this distortion may be increased by a counter electromotive force due to the reaction of the vibrating reed 7 on the magnetic field. The effects of these harmonics can be reduced by placing a condenser in parallel with the terminals of the electromagnet. The condenser should be of a size to electrically tune the system to the fundamental frequency or one of the harmonics of the applied alternating electromotive force.

This increases the sensitivity and efficiency of the device.

Figure 4 shows the mechanically resonant element 7 which is so proportioned as to have a period of vibration equal to the frequency of the alternating potential impressed at *a*—*a'* or some submultiple or harmonic thereof. The frequency of this reed may be changed or adjusted by filing off a part of the striker at 11 to increase the frequency or the frequency may be decreased by sweating, soldering or otherwise attaching thereto additional metal. The frequency may be further changed by increasing the depth of the cut of the portion of reduced section at 8 or by selecting a reed of different dimensions or modulus of elasticity.

The reed 7 is preferably adjusted to vibrate directly in proportion to the frequency of the impressed electromotive force. The magnetic flux resulting in the core 4 vibrates the reed at the greatest amplitude and efficiency when these conditions exist. With an unpolarized core and with a 60-cycle source of potential impressed at *a*—*a'* the reed should be tuned to vibrate at a rate of 120 times a second.

It will be understood that the above description and accompanying drawing comprehend only the general and preferred embodiment of this invention, and that various changes in construction, proportion and arrangement of parts may be made within the scope of the appended claims, and without sacrificing any of the advantages of this invention.

The herein described invention may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalties thereon or therefor.

Having thus described the invention, what I claim is:

An alternating current bell comprising a casing, a non-magnetic cover for said casing carrying an upstanding post and a boss thereon, a U-shaped magnetic core attached to said cover on the side thereof opposite to said post and boss by magnetic screws one of which extends through said boss, a gong mounted on said post, a reed fixedly mounted at one end on said boss by one of said magnetic screws, the free end of said reed extending adjacent to another of said magnetic screws, a striker carried by the free end of said reed, a lug member formed on said gong adjacent to the inner periphery thereof overlying said striker, and electrical means for exciting said magnetic core.

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