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R. S. EDWARDS
SIGNALING APPARATUS
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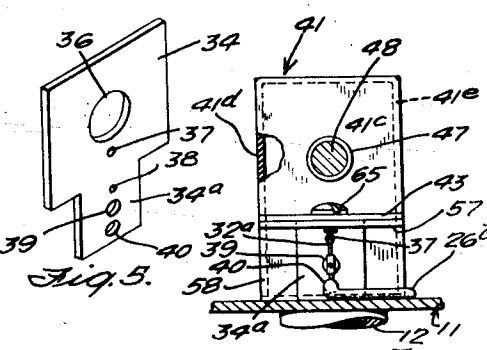
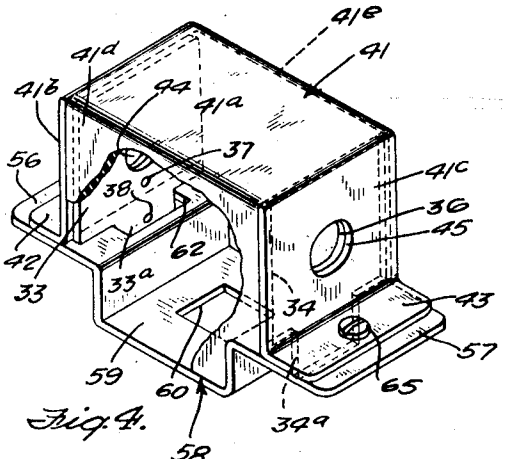
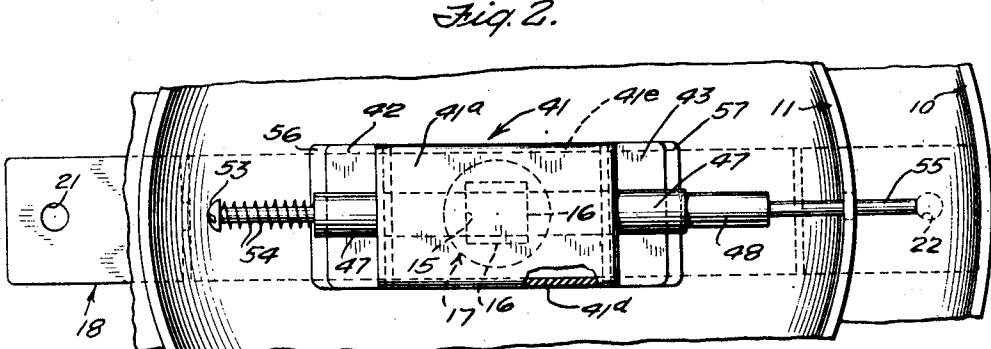
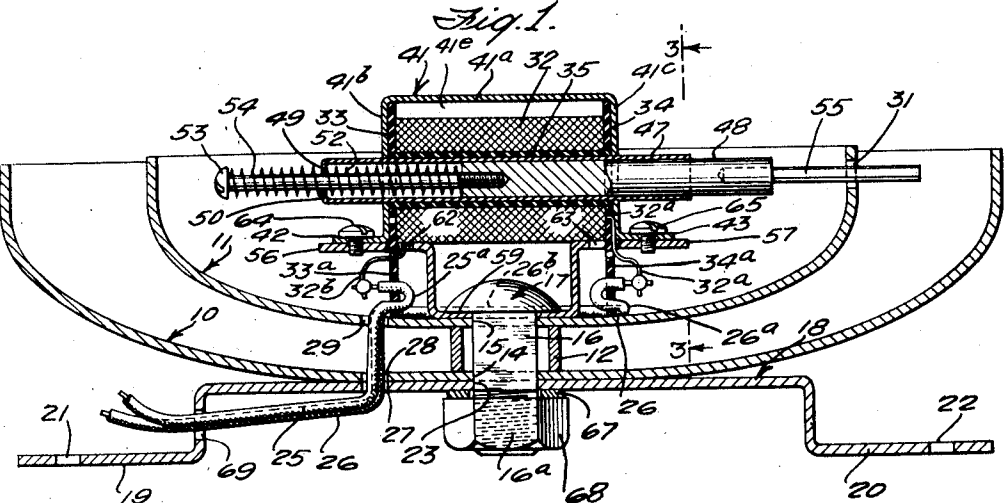


Fig. 3.
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SIGNALING APPARATUS

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This invention relates to signaling apparatus, particularly signaling apparatus, electrically actuated, of the audible type.

One of the objects of this invention is to provide a practical and inexpensive signaling construction that will be strong and durable, compact and of dependable action. Another object is to provide an electrically actuated gong construction that will be inexpensive to manufacture, capable of ready and inexpensive assembly, fool-proof in construction and action and compact in arrangement. Another object is to provide an electrically actuated gong construction that will be easy to install and well adapted to use in installations, such as on vehicles, where it is subjected to vibration. Another object is to provide in an electric gong construction sub-units or sub-assemblies capable of rapid and convenient assembly one with another to build up the signaling apparatus. Another object is to provide an electrically actuated signaling mechanism of the above-mentioned character in which electrical connection is achieved in a simple, inexpensive and durable manner. Another object is to provide a multi-tone audible signaling apparatus that will be of simple construction, compact, and characterized by simplicity and dependability of assembly in manufacture and action in practical use. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of the various possible embodiments of this invention;

Figure 1 is a central vertical sectional view through the assembled apparatus;

Figure 2 is a plan view as seen from the top in Figure 1, certain parts being broken away;

Figure 3 is an end elevation, partly in section, as seen along the line 3-3 of Figure 1;

Figure 4 is a detached perspective view of a casing part and bracket showing their interrelation in assembly, certain parts being broken away or omitted, and

Figure 5 is a detached perspective view of a part of the electromagnetic actuating means.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring first to Figures 1 and 2, let it be

assumed that it is desired to provide an audible signaling apparatus, illustratively of the bell or gong type, and that it is to be capable of sounding two different notes or tones; accordingly, I provide two gongs 10 and 11 of which gong 10 is the larger and has the lower or deeper note when set into vibration and accordingly the two gongs are proportioned so that the one is receivable within the other and is well accommodated therein, illustrative proportions of these two parts being as shown in Figures 1 and 2.

These two gongs are mounted or secured together, preferably coaxially, and where the inner gong is of less depth along its axis than the outer or larger gong, I may provide suitable spacing means, such as a collar or washer 12, to interpose between them and to effect a separation therebetween to insure that the vibration of one will not interfere detrimentally with the vibration of the other.

Preferably, gongs 10 and 11 are provided at their axes with square holes 14 and 15 to receive the square shank 16 of a bolt generally indicated by the reference character 17, collar 12 extending about the shank 16.

A preferred form of base or main support comprises a bracket 18 made of a suitably heavy strap metal and stepped downwardly at its ends, as at 19 and 20, where it is provided with apertures 21 and 22, the former to rest against a suitable supporting surface and the latter serving to receive screws or bolts to secure the bracket 18 and the structure carried by it to such supporting surface. Bracket 18 has preferably at its center a square hole 23 through which the shank 16 of the bolt 17 extends and with which it snugly interfits as do also the holes 14 and 15 of the gongs 10 and 11.

The gongs are actuated preferably electrically, as is later described in detail, and in the preferred form the lead wires, relatively heavy insulated conductors, as indicated at 25 and 26, are brought out of the apparatus and preferably related to the supporting bracket 18 to facilitate making electrical connection to the circuit conductors related to the supporting surface or other part to which the bracket 18 is secured. Accordingly, the bracket 18 is provided with a hole 27 spaced a short distance from its center and preferably aligned along the central longitudinal axis of the bracket 18, the square hole 23 having its center coincident with that axis. Illustratively, the square hole 23 is so related to this central longitudinal axis that two of its opposed parallel edges are at right angles to that

axis and the remaining two edges are parallel thereto.

Gong 10 is provided with a hole 28 positioned on a radius that is at right angles to two opposed edges of the square hole 14 in the gong 10 and at the same distance from the center of hole 14 as is the hole 27 in the bracket 18 from the hole 23.

Accordingly, when square holes 14 and 23 are properly registered and maintained in such registry by the interfitting therewith of the square shank 16, holes 27 and 28 are brought into registry, as shown in Figure 1, and together form a passage for receiving the conductors 25 and 26.

Gong 11 has a hole 29 also positioned on a radius to which two opposed edges of the square hole 15 are at right angles, and again preferably the distance of hole 29 from the center of the square hole 15 is the same as the distance of hole 28 from the center of square hole 14 in the gong 10. Accordingly, in assembly, when square hole 15 of gong 11 is appropriately aligned with the square holes 14 and 23 which are already aligned as above-mentioned, and these alinements maintained by the square shank 16, registered holes 27 and 28 are brought and held in alinement with hole 29 in gong 11 and thus, as shown in Figure 1, the conductors 25 and 26 may be brought not only through the holes 27 and 28 but also through the hole 29 and thus to the interior of the inner or smaller gong 11 within which is accommodated, in a preferred manner about to be described, the electro-magnetic mechanism for setting the gongs into vibration.

Adjacent the periphery of gong 11 (see Figure 1) is a hole 31, preferably bearing a certain geometrical relationship to the square hole 15 and the hole 29 of the gong. In the illustrative form, hole 31 is on a radius that is spaced angularly 180° from the radius on which is the hole 29, and thus hole 31 is positioned in a predetermined relation to the square hole 15 of the gong 11, for a purpose later described.

The electrically actuated gong-striking mechanism is preferably constructed in sub-units or sub-assemblies to facilitate ease and simplicity of assembly and preferably and particularly to insure simplicity and rapidity of interrelationship of the mechanism to the gongs and supporting structure. The mechanism preferably comprises a solenoid having a winding 32 preferably pre-formed or prewound in any suitable way between two end plates 33, 34, preferably made of insulating material, such as fiber, and held in spaced relationship in any suitable way, as by a tube-like member 35, which may be of insulating material and on which the wire of the winding 32 is wound preferably directly.

The end plates 33, 34 are preferably of identical construction, each having aligned downward extensions 33^a and 34^a, and in Figure 5 one of these end plates is shown in perspective and hence it will suffice to describe only one of them in detail. Thus, there is a central hole 36 with which the tube-like winding core 35 is interrelated as by being received thereinto. Preferably along the vertical center line of the extension 34^a I provide two small holes 37, 38, the former being closely adjacent to the hole 36 and hence adjacent the innermost layer of the wire of winding 32, so that the terminus or end 32^a of that innermost layer may be threaded through the hole 37 to be brought externally of the winding 32 and of the corresponding end plate, such as the end plate 34 of Figure 1.

Hole 38 is positioned at or just beyond the outermost layer of winding 32 so that the end or terminus of that layer, indicated at 32^b in Figure 1, may be brought out through the hole 38.

In the outer portion of the extension 34^a (Figure 5) I provide a hole 39 large enough to accommodate one of the insulated conductors 25 or 26 and adjacent to it but toward the outermost edge of the extension I provide a conformation also to accommodate the insulated conductor, that conformation being illustratively and preferably in the form of a hole 40 substantially like hole 39 and preferably in close proximity to it.

With the winding thus formed and with its ends 32^a and 32^b exposed externally of the end plates through holes 37 and 38, respectively, the winding may now be assembled to certain other parts of the apparatus, one of which preferably takes the form of a casing generally indicated by the reference character 41, the casing being made up preferably of sheet metal and being formed in any suitable way to accommodate and enclose the winding unit 32, 33, 34.

Thus, the casing may have a top wall 41^a, and end walls 41^b, 41^c, the latter preferably having flanges 42, 43 bent outwardly thereof and into the same plane, a plane preferably parallel to the top wall 41^a with which, as is later pointed out, the axis of the winding 32 is preferably parallel; casing 41 may also have opposed side walls 41^d and 41^e. The casing 41 is preferably integral throughout, may be constructed in any suitable way as by stamping and bending or as by drawing and bending.

Centrally of the end walls 41^b and 41^c the casing has apertures 44 and 45. The interior dimensions of the casing are preferably such as to accommodate, preferably snugly, the winding units 32, 33, 34, the latter being slid into it through the open bottom end, as viewed in Figures 1 and 4, it being noted that the end plates 33, 34 are preferably snugly received between the opposed side walls 41^d, 41^e, while the extensions 33^a and 34^a of the end plates project outwardly out of this open bottom end of the casing (see Figure 1).

In this way, the winding unit may be positioned to bring its axis and hence the axis of the tube-like core 35 and of the holes 36 in the end plates 33, 34 into coincidence with the axis of the aligned holes 44, 45 in the end walls 41^b, 41^c of the casing 41. Thereupon a tube 47, preferably of non-magnetic material like brass and suitably diametered and preferably longer than the winding unit and casing 41 (see Figures 1 and 2) is fitted through these aligned holes, the interfitting being sufficiently close to hold the tube 47 frictionally in place when brought to the position better shown in Figure 1 with its two ends projecting substantially equidistantly from the end walls 41^b, 41^c of the casing 41. Tube 47 thus locks the winding unit in the casing 41 and the two now form a sub-unit or sub-assembly by themselves.

Tube 47 may then have assembled to it certain other parts or the latter may initially be assembled to the tube and as a unit assembled to the winding and casing as above described. These parts include a solenoid core 48 of suitable magnetic material and diametered so as to slide freely within the non-magnetic tube 47, whose one end, such as the left-hand end, is closed over in any suitable way by an annular end wall 49 which hence has an aperture 50 therein.

Before inserting the core 48 into the right hand or open end of the tube 47, a helical spring 52 is inserted whereupon a suitably heavy and headed

pin 53, preferably of a non-magnetic material like brass and having first slipped over it a short helical spring 54, has its free or unheaded end passed through the hole 50 in the tube end wall 49, through the interior spring 52, whence suitable interconnection between the pin 53 and the left-hand end of the core 48 is made. Such interconnection may be as by force fitting the end of the pin 53 into a suitable coaxial hole in the end of the core 48 or such a hole may be threaded to receive the threaded end of the pin 53, the latter being the illustrative form shown in Figure 1. These interrelationships of the parts will be seen to be such that the core, pin and springs are now a unitary sub-assembly by themselves. At its right hand end the core 48 has fitted to it a relatively heavy pin or extension 55 preferably of non-metallic material, such as brass, preferably not headed. It is assembled to the core 48 in any suitable way, as by pressing its one end into a hole in the core 48 or by threading the two parts together. With respect to the extension 55, which is preferably of circular cross-section, the hole 31 in the gong 11 is proportioned to be of sufficiently larger diameter for purposes later described.

The end flanges 42, 43 are apertured as shown in Figure 1 and their under faces are to contact and mate with the upper faces of the flange-like parts 56 and 57 (Figures 1, 2 and 4) of a U-shaped bracket generally indicated by the reference character 58. Flange parts 56 and 57 have threaded apertures, as shown in Figure 1, to register with the apertures in the parts 42, 43. The bracket 58 is preferably made of a suitably heavy sheet metal and at its center and in the base portion 59 thereof it is provided with a square hole 60 dimensioned to interfit snugly with the square shank 16 of the bolt 17. It will be noted that the hole 60 is positioned so that two of its opposed edges are at right angles to the vertical plane in which is the axis of the winding 32 and hence the axis of the core and striker assembly 53, 48, 55.

Bolt 17 now has its shank entered through the square hole 60 to bring its head to rest against the upper face of part 59, the U-shape of the part 58 providing ample space for accommodating the head of the bolt. With bolt and bracket 58 thus assembled, the bracket 58 has its parts 56, 57 brought up against the under faces of the flange parts 42, 43 of the casing 41, the flange parts 56, 57 having slots 62, 63, respectively, of sufficient dimension to permit the extensions 33^a, 34^a of the end plates 33 and 34 to pass downwardly therethrough, as appears better from Figures 1 and 4. Then screws 64, 65 (Figure 1) are used to secure the bracket 58 and the housing unit together.

It will be understood, of course, that the order or sequence in which some of the above described steps of assembly are carried out may be varied or changed, as may be desired or as may be more convenient. For example, after inserting the winding unit 32, 33, 34 into the casing 41, the bracket 58, with the bolt 17 assembled thereto, may be secured to the casing, and then the core and striker assembly, such as the tube 47 of the sliding core 48 and related parts, assembled to the casing and winding unit.

In either case, in the preferred arrangement, the bracket 58 completes the enclosure of the winding unit, forming virtually the bottom or closing wall of the casing, and projecting therefrom, as above noted, are the extensions 33^a, 34^a

of the end plates with the free ends 32^a and 32^b of the winding 32 projecting laterally of the extensions, and thus ready to have the heavier lead wires 25 and 26 related thereto.

In the preferred arrangement, each lead wire is mechanically anchored to its associated end plate extension and then its conductor is electrically connected as by soldering to the corresponding end of the winding.

A preferred arrangement for anchoring the lead wire is as shown in Figure 1. Thus, the conductor 25, after having a short length of its insulation stripped from its end so as to bear the conductor thereof, is bent into the shape of a U, as at 25^a, the free or short end of the latter being passed through the hole 39 in the extension 33^a and the longer or other end seated in the conformation 40 (see Figure 5) of the extension, thus exposing the bared end of the lead wire 25 on the same side of the extension 33^a on which the end 32^b of the winding is exposed. With the heavier lead wire 25 thus interlocked with and anchored to the end plate 33, its bared end may now be electrically connected to the wire 32^b, as by soldering. The other lead wire 26 is similarly treated with respect to the extension 34^a of the other end plate, being given the shape of a U, as at 26^a, the arms of which pass through the conformations 39 and 40 of the extension and its bared end being connected as by soldering to the end 32^a of the winding.

Thus, while the wire of the winding 32 and hence its ends 32^a and 32^b may be relatively small or fine in size and the lead wires 25 and 26 relatively heavy, the latter are dependably anchored mechanically and thus any bending or movement, during handling and assembly of the heavier lead wires 25, 26, is prevented from subjecting the fine wire ends 32^a, 32^b or the soldered connections to any stresses or strains as might disrupt them.

The resultant sub-assembly, in the illustrative form, thus comprises the housing or casing 41, 58 with the above-described parts assembled thereto, the lead wires 25 and 26 and the square shank 16 of the bolt 17 projecting downwardly therefrom. Next, the gong 11 is related to this sub-assembly and first the lead wires 25, 26 are passed through the hole 29 in the gong, thus bringing the sub-assembly and the gong 11 in proper angular relationship for the passage of the square shank 16 of the bolt into and through the square hole 15 of the gong and also, bearing in mind the above-described relationship between the holes 29, 15 and 31, bringing the striker pin 55 in general alinement with the hole 31. The striker pin 55 is entered through the hole 31 of the gong, then the square shank of the bolt entered through the hole 15 of the gong 11, the collar or spacer 12 slipped onto the bolt shank, the free ends of the lead wires 25, 26 passed through the holes 28 and 27 of the gong 10 and supporting bracket 18 which are held or temporarily assembled to bring these holes into alinement, whence again there takes place a proper positioning of gong 10 and bracket 18 to permit the square shank of the bolt to enter the square holes 14 and 23 of the gong 10 and bracket 18 in proper relationship.

A suitable lock washer 67 may then be slipped onto the bolt shank, whence a nut 68 is threaded onto the threaded end 16^a of the shank and tightened up to draw the parts 58, 11, 12, 10, 18 and 67 tightly together to hold them in assembled relation. It will be noted that the bolt 17, 75

through the relationship between the cross-section of its shank and the shape of the holes in the structural parts, is prevented from rotating relative to the latter so that tightening up of the nut 68 is easily achieved, while, also, relative rotary displacement of any of the structural parts about the axis of the bolt 17 is dependably precluded and the relationship of assembly of the parts dependably maintained.

For example, these latter actions insure that the striker pin 55 of the core has its axis substantially coincident with the center of the hole 31 in the gong 11, the difference in diameters of these two parts being sufficient to allow for adequate clearance between the two parts. Also, relative twisting between the electromagnetic sub-assembly, such as the casing 41, 58 with the parts carried by it, relative to the gong 11, or between the gong 11 and the gong 10 or between the gong 10 and the supporting bracket 18, cannot take place and thus the danger of shearing the lead wires 25 and 26 or of injuring the insulating covering thereof is dependably eliminated.

In this form the unit or apparatus may be installed, the winding 32 being connected to the circuit by utilizing the lead wires 25 and 26 which conveniently may also be made to pass through a hole 69 in the bracket 18, as in Figure 1, to bring the ends of the leads to the same side of the plane of the bracket parts 19, 20 from which the securing screws or bolts are put in place.

In effecting the assembly, as above described, lead wire 26 is bent or conformed, as is better indicated at 26^b in Figure 3, to extend about or around the bracket 58 and to the hole 29 (Figure 1) through which it is extended with the lead wire 25, as above described.

In operation, the movable parts are normally in the position shown in Figures 1 and 2; upon energization of the winding 32, the magnetic flux produced by the latter is effective to pull the core 48 relatively quickly to the left, compressing the spring 52, the striker pin 53 giving the gong 11 a blow, the core with the parts carried by it rebounding, aided by the action of the energy stored in the compressed spring 52. If the circuit is then broken, as it would be if controlled, for example, by a push button switch, the core 48 is quickly thrust by the expansion of the spring 52 in a direction toward the right, causing the striker pin 55 to strike the gong 10. During the movement in this latter direction the shorter and relatively light spring 54 is compressed to aid in restoring the moving parts, on the ensuing rebound, to the normal position as shown in Figure 1. If the winding 32 is not immediately deenergized, the magnetic flux holds the core 48 sufficiently to the left and the spring 52 sufficiently compressed, but with the striker pin 53 out of contact with the gong 11, to insure, when the winding becomes deenergized, that the spring 52 thrusts the core 48 to the right with sufficient energy to cause the striker pin 55 to strike the other gong 10 as above described.

Thus, the signaling apparatus sounds two notes of different pitch, and in this connection it is to be noted that I have discovered that the quality of the musical note sounded is substantially unimpaired by the fact that the gongs have holes drilled or provided in them, such as the holes 31, 29 and 28. The latter two holes 28 and 29 are preferably positioned relatively closely to the axis of the bolt 17 and thus have a minimum effect upon the character of vibration of the respective gongs. Hole 31, however, will be seen to be positioned, in the illustrative embodiment, in that

region of the gong 11 that is subjected to vibration in nodes and inter-nodes, yet, as above noted, the presence of hole 31 has, I have discovered, a negligible, if any, effect, for practical purposes, upon the action of the gong itself.

Thus, it will be seen that there has been provided in this invention a signaling apparatus in which the various objects above noted, together with many thoroughly practical advantages, are successfully achieved. It will be seen that the apparatus is of dependable and unique action in practical use, yet is of thoroughly practical construction and of inexpensive manufacture.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In signaling apparatus, in combination, two gongs of generally convexo-concave shape, one being smaller than the other and received within, and with its convex side facing toward the concave side of, the larger, a solenoid having a core with striker elements at each end of the latter, a support for said solenoid for positioning it within the concavity of the smaller gong with the axis of said core aligned substantially along a diameter of said smaller gong, the latter having an aperture for the passage therethrough of one of said striker elements, said gongs each having a hole substantially at its center and said support having non-rotatably connected with it a stud-like member for entry into and interfitting with the holes in said gongs and for thereby aligning said solenoid and said two gongs, said stud-like member and the hole in said smaller gong having cross-sectional shapes to effect non-rotational interfitting between said support and said smaller gong and thereby aligning the axis of said core and of one of said striker elements with said aperture for movement of said striker element into engagement with the larger gong upon movement of said core in one direction and thereby aligning the other striker element relative to the smaller gong to engage the latter upon movement in reverse direction of said core.

2. In signaling apparatus, in combination, a gong having a hole substantially at its center and an aperture displaced from said hole, gong-striking mechanism comprising a striker and electro-magnetic means for actuating said striker, said gong-striking mechanism having means adapted to enter said hole in said gong for positioning said mechanism and said gong so that the striker is operatively positioned relative to the gong, said mechanism having a lead wire extending therefrom and through said aperture in said gong, said means and said hole being shaped to effect non-rotatable engagement therebetween and for thereby preventing relative rotary movement about the axis of said gong and between the latter and said mechanism, thereby to prevent shearing strains on said lead wire passing through said aperture.

3. In signaling apparatus, in combination, a gong having a hole substantially at its center, a bracket support having a hole adapted to register with said first-mentioned hole, said gong and bracket each having an aperture registrable one with another when said gong and bracket support have a certain relation to each other about the axis of said gong, electromagnetic gong-strik-

ing means having a lead wire, and means securing said mechanism, said gong and said bracket support together and comprising a member having non-rotatable engagement with said two holes for thereby fixing said gong and bracket support in said certain relation to bring and hold said apertures into registry, said lead wire extending through said registering apertures.

4. In signaling apparatus, in combination, a gong having a polygonal hole substantially at its center, electromagnetic striking mechanism for said gong having a lead wire and a supporting member provided with a hole substantially similar to said polygonal hole, means for securing said mechanism and said gong together and comprising a polygonally cross-sectioned member interfitting with said two polygonal holes and thereby fixing the relative angular position of said gong and mechanism, said gong having an aperture therein fixed in position by the interfitting between said holes and said polygonal member for the passage therethrough of said lead wire.

5. In signaling apparatus, in combination, a gong having a polygonal hole substantially at its center, electromagnetic striking mechanism for said gong having a lead wire and a supporting member provided with a hole substantially similar to said polygonal hole, means for securing said mechanism and said gong together and comprising a polygonally cross-sectioned member interfitting with said two polygonal holes and thereby fixing the relative angular position of said gong and mechanism, said mechanism comprising a winding of relatively fine wire and having interlocked with said supporting member a plate-like member of insulating material which has anchored thereto a relatively heavy insulated lead wire that has electrically connected to it said fine wire of said winding, said gong having an aperture therein fixed by the interfitting of said member with the said hole in said gong for the free passage therethrough of said lead wire, whereby strains imposed upon said lead wire are taken up by said insulating member and said fine wire relieved from strain.

6. In signaling apparatus, in combination, a sounding element having an aperture, a bracket support having an aperture, electromagnetic means for setting said sounding element in vibration, said means having a lead wire of a length sufficient to extend through the aperture in said sounding element and through the aperture in said bracket support, said electromagnetic means having a part with a hole in it and said sounding element and bracket support each having a hole, said holes being alined, and a member passing through said three holes and having non-rotatable engagement with the walls of said holes for securing said bracket support, said sounding element and said part together and for holding said two apertures in alinement for the reception therethrough of said lead wire.

7. In signaling apparatus, in combination, a sounding element having an aperture, a bracket support having an aperture, electromagnetic means for setting said sounding element in vibration, said means having a lead wire of a length sufficient to extend through the aperture in said sounding element and through the aperture in said bracket support, said electromagnetic means comprising a casing-like closure therefor, said closure having a detachable part with a hole therein for the reception of a headed stud-like member, the head of which is substantially with-

in said casing-like closure, said sounding element and bracket support each having a hole through which said stud-like member passes for alining them relative to said enclosure and hence to said electromagnetic means.

8. In signaling apparatus, in combination, a sounding element, electromagnetic means for setting said element into vibration, said electromagnetic means having a bracket-like part with means detachably securing the latter thereto, said bracket-like part having a hole therein with a headed stud-like member extending there-through but with the head accommodated between said bracket-like part and the rest of said electromagnetic means, and means for securing said sounding element to said stud-like member.

9. In signaling apparatus, in combination, a sounding element, electromagnetic means for setting said element into vibration, said electromagnetic means having a bracket-like part with means detachably securing the latter thereto, said bracket-like part having a hole therein with a headed stud-like member extending there-through but with the head accommodated between said bracket-like part and the rest of said electromagnetic means, a supporting member having an aperture for the reception of said stud-like part for mechanically interconnecting said member and said electro-magnetic means, and means supporting said sounding element in operative relation to said electromagnetic means.

10. A sub-assembly comprising electromagnetic striker mechanism having a winding and a casing-like enclosure therefor, the latter having a detachable bracket-like part with a hole therein, a headed stud-like member received in said hole with the head accommodated in the space between said part and the rest of said mechanism, whereby said stud-like member is exposed externally of said mechanism.

11. A sub-assembly comprising electromagnetic striker mechanism having a winding and a casing-like enclosure therefor, the latter having a detachable bracket-like part with a hole therein, a headed stud-like member received in said hole with the head accommodated in the space between said part and the rest of said mechanism, whereby said stud-like member is exposed externally of said mechanism, and is thereby available for association therewith of other parts, said electromagnetic mechanism having a lead wire externally thereof with means mechanically anchoring said lead wire thereto against strains imposed upon the lead wire, there being means forming an electrical connection between said anchored lead wire and said winding.

12. A sub-assembly comprising a casing open at one end, a winding having end plates with the two ends of the windings mechanically interrelated with portions of said end plates respectively, said winding with said end plates being receivable into said casing through the open end thereof and said end plates having said portions projecting beyond the open end of said casing, and a member taking over the closed end of said casing and having cut away portions to accommodate said portions of said end plates, the latter having means for mechanically anchoring thereto relatively heavy lead wires, one to each end plate portion, for electrical connection to the respective ends of said winding.

13. A sub-assembly as claimed in claim 12 in which said member has a hole therein with the shank portion of a headed stud-like member

received in said hole and with the head on that side of said member that faces inwardly of said casing.

14. A sub-assembly comprising a casing open at one end, a winding having end plates with the two ends of the windings mechanically inter-related with portions of said end plates respectively, said winding with said end plates being receivable into said casing through the open end thereof and said end plates having said portions projecting beyond the open end of said casing, and a member taking over the closed end of said casing and having cut away portions to accommodate said portions of said end plates, the latter having means for mechanically anchoring thereto relatively heavy lead wires, one to each end plate portion, for electrical connection to the respective ends of said winding, said member having a hole therein with the shank portion of a headed stud-like member received in said hole and with the head on that side of said member that faces inwardly of said casing, a sounding element, said winding having means for coacting with said sounding element to set it into vibration, said sounding element having a hole for the reception of the shank portion of said stud member and having aperture means for the passage therethrough of said lead wires, said shank portion having non-rotatable connection with said sounding element to thereby properly locate and hold said aperture means relative to said lead wire anchorages.

15. A sub-assembly comprising a casing open at one end, a winding having end plates with the two ends of the windings mechanically inter-related with portions of said end plates respectively, said winding with said end plates being receivable into said casing through the open end thereof and said end plates having said portions projecting beyond the open end of said casing, and a member taking over the closed end of said casing and having cut away portions to accommodate said portions of said end plates, the latter having means for mechanically anchoring thereto relatively heavy lead wires, one to each end plate portion, for electrical connection to the respective ends of said winding, said member having a hole therein with the shank portion of a headed stud-like member received in said hole and with the head on that side of said member that faces inwardly of said casing, supporting means having a hole therein for the reception of the shank portion of said stud-like member and having aperture means for the passage therethrough of said lead wires, said stud-like member fixing the relative position of the parts for the proper passage through said aperture means of said lead wires.

16. A sub-assembly comprising a casing open at one end, a winding having end plates with the two ends of the windings mechanically inter-related with portions of said end plates respectively, said winding with said end plates being receivable into said casing through the open end thereof and said end plates having said portions projecting beyond the open end of said casing, and a member taking over the closed end of said casing and having cut away portions to accommodate said portions of said end plates, the latter having means for mechanically anchoring thereto relatively heavy lead wires, one to each end plate portion, for electrical connection to the respective ends of said winding, said member hav-

ing a hole therein with the shank portion of a headed stud-like member received in said hole and with the head on that side of said member that faces inwardly of said casing, a sounding element, said winding having means for coacting with said sounding element to set it into vibration, said sounding element having a hole for the reception of the shank portion of said stud member and having aperture means for the passage therethrough of said lead wires, supporting means having a hole therein for the reception of the shank portion of said stud-like member and having aperture means for the passage therethrough of said lead wires, said holes and said shank portion having cross-sectional shapes to hold their respective parts against rotary movement relative to each other and thereby holding the aperture means in said sounding element and in said supporting means in proper relationship for the passage therethrough of said lead wires.

17. A sub-assembly comprising a casing open at one end, a winding having end plates, said winding with said end plates being receivable into said casing through the open end thereof and said end plates having portions projecting beyond the open end of said casing, means for holding said winding within said casing, said end portions of said end plates each having aperture-like conformations with a lead wire substantially U-shaped at its end and interlocked with said plate end portions through said aperture-like conformations, thereby to anchor said lead wires to said end plates, said lead wires having electrical connection with the respective ends of said winding.

18. A construction as claimed in claim 17 in which the means for holding said winding in said casing comprises tube-like means, said winding having a conformation to permit the passage therethrough of said tube-like means and opposed ends of said casing having apertures for receiving opposed ends of said tube-like means, said tube-like means forming a support for a core means of magnetic material for said winding.

19. In signaling apparatus, in combination, a sounding element, electromagnetic means for setting said element into vibration and comprising a winding having end plates, means mechanically assembling said sounding element and said electromagnetic means and including two spaced parts between which said winding with said end plates respectively adjacent said two spaced parts is received, at least one of said end plates having mechanically anchored thereto a lead wire which is in electrical connection with said winding, and means for holding said winding with its end plates against displacement relative to said two spaced members whereby strains on said lead wire are transmitted through said end plate to the spaced part to which it is adjacent.

20. A construction as claimed in claim 19 in which the means for holding said winding and its end plates against displacement relative to said two spaced parts comprises tube-like means passing through the spaced parts and the respectively adjacent plate members and through the winding, said tube-like means forming a support for a core means of magnetic material, and means whereby energization of said winding effects vibration of said sounding element through said core means.

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