June 24, 1930. J. T. MILLER ET AL 1,765,768

GONG

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Fig. 1.

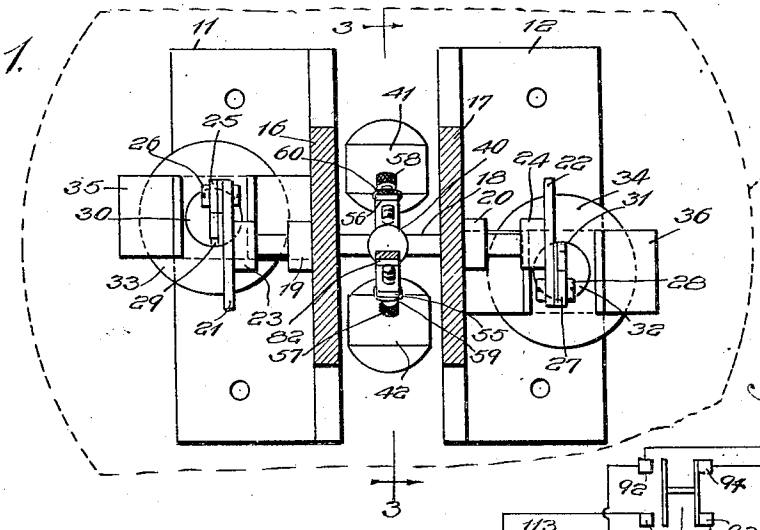


Fig. 7.

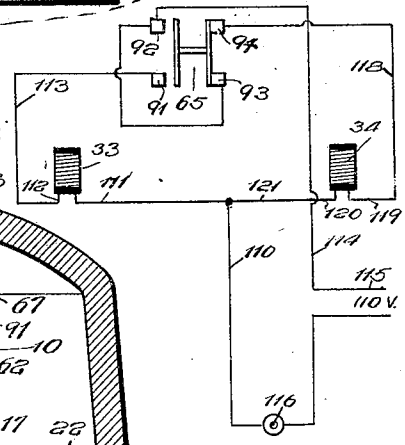


Fig. 2.

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Fig. 3.

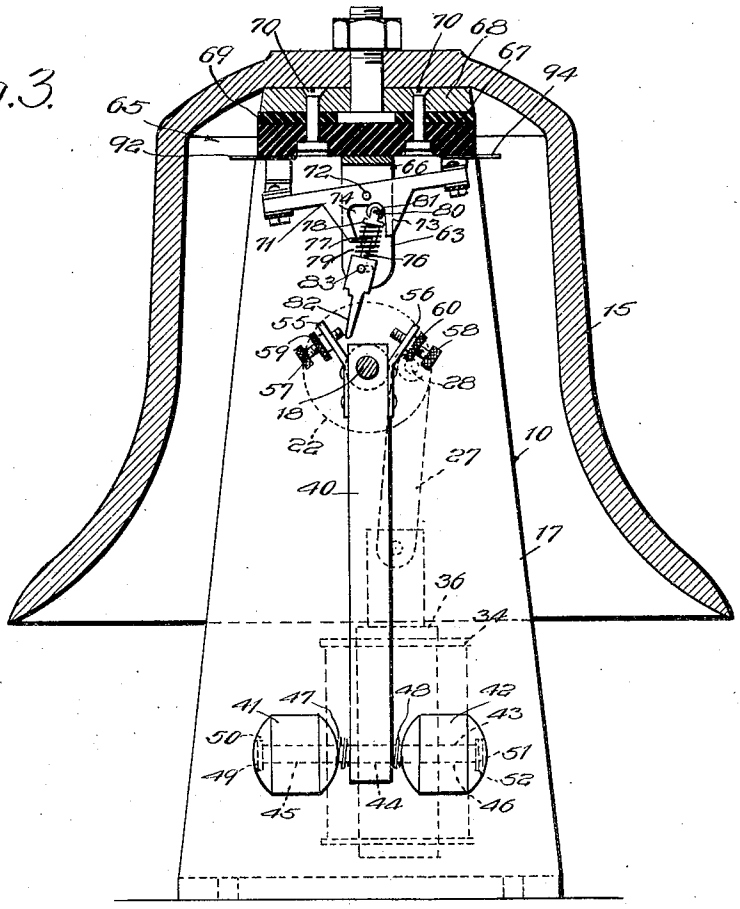


Fig. 4.

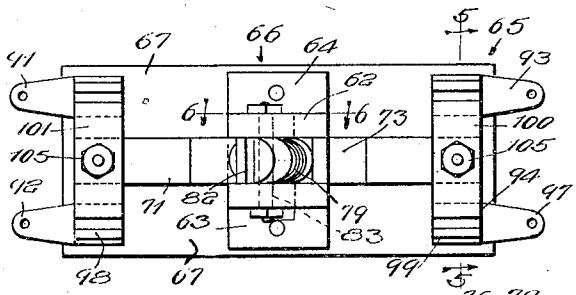


Fig. 5.

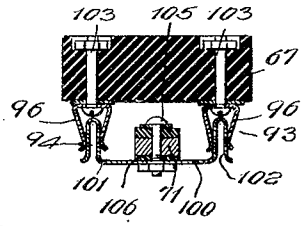
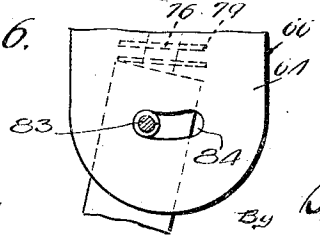


Fig. 6.



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UNITED STATES PATENT OFFICE

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GONG

Application filed July 14, 1926. Serial No. 122,303.

Our invention pertains in general to improvements in gongs and more particularly to a novel gong construction employing a pendulum hammer.

In practice we have found that the usual type of ringer or gong is not very satisfactory for outdoor use since the sound waves sent out therefrom are not strong enough to carry very far. Most of these devices include a tapper actuated by a oscillatory armature. Then too, the sound emanating from this type of instrument is usually deadened by the rebound of the associated gong. That is to say, no satisfactory provision is made for compensating for the rebound of the gongs.

We are also aware of the so-called harmonic ringer used so extensively in telephony. These ringers employ a vibrating reed actuated by suitable solenoids. Although in these ringers provision is made for compensating for the rebound of the gong and hence the sound sent out therefrom is relatively clear when used indoors, we do not find that they are satisfactory for outdoor use inasmuch as the volume of their sound is not great enough to carry very far.

Furthermore, harmonic ringers depend for their operation upon the vibration of a tapper reed. Now obviously, each individual reed has a vibration period of its own and hence an adjustment is necessary in order to have the reed vibrate at a period commensurate with that of the gong. This factor becomes of more importance as the size of the ringer is increased and if not provided for the quality of its sound will be deleteriously affected. Therefore, in general these ringers are not suitable for outdoor use where a relatively great sound is desired.

We propose to provide an improved gong, particularly adapted for outdoor use and which is adapted to send out a signal which can be heard at a comparatively great distance from the instrument. Our device is especially designed for use as a warning signal.

In the device of our invention we do not employ a vibrating tapper but substitute therefor a pendulum arm having a hammer associated with its free end.

Also we provide novel means for actuating the pendulum. The effective force of this means is at a minimum upon the movement of the pendulum from its place of rest but gradually increases as the pendulum is swung outwardly so that it is at a maximum when the pendulum reaches an end of its arc of movement. This actuating means in the preferred embodiment of our invention, in general comprises solenoid actuated rods and cranks connected to a shaft to which the pendulum arm is fastened.

Furthermore, we provide the fixed end of the pendulum with means for operating a novel double throw switch of our invention which causes the alternate operation of the solenoids associated therewith. In other words, we cause the pendulum operating means to be controlled by the moving pendulum itself. Moreover, we provide novel means for adjusting the action of the pendulum on the double throw switch.

Other objects and advantages of our invention will more fully appear in the following detailed description taken in connection with the accompanying drawings which illustrate one embodiment thereof, and in which:

Fig. 1 is a plan view of our device, partly in section, with the gong removed;

Fig. 2 is a side elevation of our sounding instrument showing the gong in section;

Fig. 3 is a sectional view taken on substantially the line 3—3 of Fig. 1, looking in the direction indicated by the arrows;

Fig. 4 is an elevation of our novel double throw switch;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a view taken on the line 6—6 of Fig. 4 looking in the direction indicated by the arrows; and

Fig. 7 is a view of an electrical circuit which may be employed in conjunction with our device.

Referring now to the drawings and details in which like numerals designate similar parts throughout the several views, 10 denotes generally a U-shaped bracket having a pair of longitudinal lateral flanges 11 and

12. These flanges may be secured to any suitable mounting upon which the gong is to be disposed. The U-shaped bracket 10 may be made of any conventional iron casting, or other analogous material. Secured to the top of the bracket 10 is a threaded bolt 13 extending through an aperture 14 in a gong 15. A nut 14' is threaded onto the said bolt 13 to maintain the gong 15 in position. The gong 15 can be of any suitable shape but is illustrated as having a bell-like form. This gong 15 encircles the upper part of the bracket 10 and serves as a cover for protecting the operating mechanism associated therewith as is obvious from Fig. 2.

The U-shaped bracket 10 includes a pair of parallel legs 16 and 17 through which extends a shaft 18 positioned at substantially right angles to the plane of the bracket. This shaft 18 is suitably journaled in the two legs 16 and 17 of the bracket 10. The shaft 18 is prevented from being moved endwise with respect to the bracket by means of a pair of collars 19 and 20 suitably secured to the shaft. Each of these collars 19 and 20 is disposed outside of the bracket and abuts a leg of the bracket 10. The collar 19 is associated with the leg 16 of the bracket and the collar 20 is associated with the leg 17 of the bracket (Fig. 2).

Mounted on the ends of the shaft 18 are a pair of annular discs 21 and 22 having hubs 23 and 24 respectively. The hubs 23 and 24 are suitably secured to the shaft 18. Now each of these discs 21 and 22 serve as a crank in our device. In other words, these discs are crank discs. Associated with the disc 21 is the upper end of a link 25 which is pivotally connected thereto by means of a bolt and nut designated generally by the reference character 26. Also associated with the disc 22 is a link 27 pivotally connected to the disc by means of a bolt nut designated generally by the reference character 28. The lower end of the link 25 is disposed in a slot 29 in a plunger 30 and is pivotally fastened to the plunger. Similarly the lower end of the link 27 extends into a slot 31 in a plunger 32 spaced from the plunger 30 and is pivotally secured thereon.

As best shown in Fig. 1 the pivotal connection between the link 25 and the disc 21 is disposed on a side of the axis of the shaft 18 opposite to that of the pivotal connection between the link 27 and the disc 22. The links are each disposed at a slight angle to the axis of the associated plunger as clearly shown in Fig. 3. The plungers 30 and 32 are disposed parallel to each other and extend down below the bell or gong 15.

The plunger 30 extends down into the center of an electrical magnet or solenoid 33 and the plunger 32 extends down into a solenoid 34. The solenoid 33 is anchored to the leg 16 of the bracket 10 by means of a U-shaped yoke member 35 and the solenoid 34 is anchored to the leg 17 of the bracket 10 by means of a U-shaped yoke member 36. The yoke members 35 and 36 are preferably made of iron and serve to strengthen the magnetic field of their respective solenoids.

The plungers 30 and 32 constitute cores as far as the solenoids 33 and 34 are concerned. Also the plungers 30 and 32 do not normally extend clear down to the solenoids. As will be described more in detail hereinafter, the solenoids are adapted to be alternately energized to draw down the plungers 30 and 32.

Positioned between the legs 16 and 17 of the bracket 10, is a pendulum arm 40 having its upper end fixed to the shaft 18. The lower end of the arm 40 (Fig. 3 has associated therewith a pair of hammers or tappers 41 and 42 which are resiliently connected thereto.

The hammers 41 and 42 are loosely mounted on a circular pin 43 extending through an aperture 44 in the lower end of the pendulum arm 40. The hammer 41 has an aperture 45 through which the pin 43 extends and the hammer 42 has an aperture 46 through which the pin extends. Surrounding the pin 43 are a pair of springs 47 and 48, one being positioned between the hammer 41 and the arm 40 and the other being positioned between the hammer 42 and the arm 40. Also the end of the pin 43 associated with the hammer 41 is provided with an enlarged head 49 which sits in a countersunk portion 50 in the hammer 41. Similarly the end of the pin 43 associated with the hammer 42 is provided with an enlarged head 51 which is adapted to fit into the countersunk portion 52 of the hammer 42. These head portions 49 and 51 are adapted to limit the outward movement of the hammers 41 and 42. Now, obviously, when either of the hammers tap the gong 15, the rebound of the gong will be compensated for by the spring associated with that hammer which will be compressed thereby. Then, too, the springs are responsive to the jars of the hammers 41 and 42 and prevent to a considerable extent the transmission of these jars to the pendulum arm 40. This arrangement prevents the crystallization of the parts associated with the pendulum arm 40.

The upper and fixed end of the pendulum arm 40 has fastened thereto a pair of laterally extending ears or extensions 55 and 56 (Fig. 3). The extension 55 has threaded therein a stud or screw 57 and the extension 56 has threaded therein a screw 58. Also threaded on the screw 57 is a lock nut 59 and threaded on the screw 58 is a lock nut 60. These two screws 57 and 58 constitute adjusting screws in our device. The ends of the screws 57 and 58 are adapted to alternately engage a downwardly extending arm 82 of a double throw switch designated generally by the reference character 65. This double throw switch 65 is of much the same general construction as that disclosed in our Patent No. 1,619,148,

dated March 1, 1927. This switch 65 is electrically connected to the two solenoids 33 and 34 and is adapted to alternately cause these solenoids to be energized. The electrical circuit involved will be more fully described in connection with Fig. 7 hereinafter.

The arm 62 of the switch 65 is loosely connected to the links 63 and 64 of a U-shaped bracket member 66. The bracket 66 is in turn fastened to a base 67 preferably made of slate or the like. The base 67 (Fig. 3) is insulated from the top 68 of the bracket 10 by means of an electrical insulator 69. The base 67 and the insulator 69 are both fastened to the top portion 68 (Fig. 3) by means of screws and nuts designated generally by the reference character 70.

Referring now again to the bracket 66 it will be noted that a lever-like arm 71 extends into the space separating the spaced legs 63 and 64. This arm 71 is pivotally attached to the bracket 66 by means of a pivot pin 72. Also the arm has provided at its center, adjacent its pivot, a lateral extension 73 equipped with a pocket 74 including cam surface 75. The arm 62 has a reduced or pinlike portion 76 (Fig. 3) which extends into a sleeve member 77. The sleeve 77 has a shoulder 78 between which and the arm 62 is a compression spring 79. The end of the sleeve has formed integral therewith, a bifurcated portion 80 which rotatably carries a roller 81. This roller 81 is adapted to be at all times urged into engagement with the cam surface 75 within the pocket 74. The operation of this construction is much the same as that of our construction disclosed in our aforesaid co-pending patent application.

The arm 62 has a flat portion 82 which is engageable by the previously described adjustable screws on the end of the pendulum arm 40. As best shown in Fig. 6 the arm 62 has secured thereto a pin 83 the opposite ends of which extend into elongated apertures 84 in the associated legs of the U-shaped bracket 66. Since both of these elongated slots are identical in construction, we shall only describe one of them in detail. The slot 84 as shown in Fig. 6 is somewhat arcuate in shape and is positioned so that the vertical axis of the pendulum arm extends substantially through the center thereof. In other words, the slot 84 extends on either side of the center of the lever arm of the switch. Thus before the arm 62 is effective to rock the switch lever arm 71 it is necessary to move the pin 83 from one side of the slot 84 to the other. In so moving the arm 62 it is moved past the center line of the lever 71 and hence will at no time tend to be locked in a central position.

The switch arm 71 is adapted to cooperate with four contacts, 94, 91, 92 and 93 secured to the base 67. Since each of these four contacts is identically constructed we believe the description of one will suffice for the four. As best shown in Figs. 4 and 5 each contact comprises a U-shaped portion 96 and a laterally extending terminal lug 97. The legs of the U portion 96 are bent towards each other as shown in Fig. 5. The ends of the lever arm 71 are provided with a pair of contact members 98 and 99 adapted to cooperate with the contacts 91 and 92, 93 and 94 respectively. Since both of these contact arms 98 and 99 are identical in construction, it is believed a description of one will suffice for both. Each of these contact arms includes an element 100 having its ends bent into U-shaped portions 101, and 102 which are adapted to cooperate with the contacts.

Referring to Fig. 5 it will be noted that the contacts are secured to the base 67 by means of bolts and nuts designated generally by the reference character 103. Also it will be observed that the contact arm 100 is fastened to the end of the lever arm 71 by means of a bolt and nut designated generally by the reference character 105. The arm 100 is insulated from the arm 71 by means of an insulator 106.

From the foregoing it will be obvious that each contact arm is adapted to connect a pair of contacts. The contact arm associated with one end of the switch lever 71 is adapted to electrically connect the contacts 93 and 94 and the other contact arm is adapted to electrically connect the contacts 91 and 92. Also it should be observed that one set of contacts is at all times electrically connected; the set connected depending upon the position of the switch lever 71.

Each of the U-shaped portions of each contact arm is adapted to be inserted between the resilient legs of the associated contacts. Also the legs of the contact are adapted to spread apart by the U-shaped portion of the contact arm as well as to be resiliently urged towards each other and into relatively tight engagement with the legs of the U-shaped portion of the contact arm. Moreover, the legs of the U-shaped portions 101 and 102 are, when in an engage position, urged outwardly into engagement with the associated legs of the contacts. This arrangement insures a good electrical contact between the terminals and the contact arm and enables a good electrical connection between each pair of contacts.

The switch is adapted to alternately close two pairs of contacts which control the operation of the two solenoids 33 and 34. In other words, each time the switch is actuated, one solenoid is deenergized and the other is energized. Any suitable electrical circuit may be employed for causing the alternate operation of the two plungers 30 and 32. In Figs. 7 we have illustrated somewhat diagrammatically an electrical circuit which may be used in connection with our novel device for the purpose above mentioned. In this circuit one leg 110 of a battery line is connected to

one end of the winding on the solenoid 33 as indicated at 111. The other end of the winding on the solenoid 33 as indicated at 112 is connected to a conductor 113 whose end terminates in the contact 91 of the switch 65. The contact 92 is connected directly to the lead 114 of the power line previously mentioned. This power circuit includes a 110 V connection 115 and a suitable circuit breaking device 116 which may take the form of a push button or a suitable electrical switch.

The contact 92 is connected by a strap wire 117 to the contact 93, the contact 94 is connected by the electrical conductor 118 to one end of the winding on the solenoid 34 as indicated at 119. The other end 120 of the winding on the solenoid is connected by a conductor 121 to the lead wire 110.

In Fig. 7 we have illustrated the contacts 93 and 94 as being electrically connected by the associated contact arm of the switch blade. When these two contacts are electrically connected, the solenoid 34 is energized and the associated plunger is pulled downwardly under the magnetic effect of the winding. Upon the actuation of the switch by the swinging pendulum arm 40, the two contacts 93 and 94 are disconnected and the two contacts 91 and 92 are contemporaneously connected. This results in the energization of the solenoid 33 causing the plunger associated therewith to be pulled downwardly to actuate the pendulum. Obviously, in order for the circuit to be effective, however, it is necessary that the circuit breaking device 116 be closed. Upon the closing of this device which may be done by the pressing of a button, or the actuation of a suitable switch, our device is set into operation and continues in operation until the circuit breaking device 116 is opened.

The operation of our device is briefly as follows: In order to set the device into operation, the previously mentioned circuit breaking device 116 is actuated to close the electrical circuit associated therewith. This results in one of the solenoids being energized. The solenoid that will be energized depends upon which pair of contacts is closed by the double throw switch 65. The magnetic effect of the energized solenoid causes the plunger disposed therein to be slowly pulled downward. The initial pull or the initial force exerted upon the plunger will be relatively small but will be constantly increased as the plunger is drawn downwardly. It is evident that it will not require very much force to move the pendulum arm 40 from its position of rest outwardly. As mentioned above, the effect of the magnetic flux on the plunger is at a minimum upon the beginning of the movement of the plunger. As the plunger is drawn downwardly, however, this magnetic effect becomes stronger and the outward movement of the pendulum arm increases. In other words, the pendulum arm is swung outwardly with an increasing velocity so that when it reaches the limit of its arc of movement it will have obtained its maximum velocity. This causes the hammer of the pendulum arm to hit the gong with a relatively sharp and hard knock, resulting in a clear sound emanating from the gong.

Also, the resilient mounting provided for the gong hammers enables these hammers to respond to the rebound of the gong thus preventing this rebound from interfering with the sound waves sent out from my device. Then too, this resilient mounting serves to prevent the transmission of forces and knocks to the parts of the pendulum arm thus preventing their crystallization.

The arc of movement of the pendulum arm, or rather the period of the pendulum arm may be varied by the adjusting screws 57 and 58, which are adapted to snap the switch arm 62 to and fro past the center of the device. The previously described elongated arcuate shaped slot 84 prevents the arm 62 from being swung or locked in a central position. In other words, this arrangement insures that one set of the contacts carried by the switch will at all times be closed by the switch arm.

Although we have illustrated our novel oscillatory pendulum arm construction as being associated with a bell gong, it is, of course, to be understood that the invention is not to be limited thereby, but only in so far as defined by the scope and spirit of the appended claims.

We claim:—

1. In combination, a gong, a support therefor, a pendulum arm connected to the said support, a pair of hammers associated with the free end of the said pendulum arm, resilient means between each of the said hammers and said pendulum arm, said resilient means being adapted to compensate for the rebound of the said gong when the hammers tap the same, and electro magnetic means associated with the pendulum arm for initiating the operation of the same and for oscillating the same, said electro magnetic means comprising a pair of solenoids and switch means controlled by the movement of the pendulum arm for alternately operating said solenoids.

2. In a gong ringing mechanism, a shaft pivotally mounted on a support, a rigid arm mounted on said shaft, a pair of pins attached to the free end of said arm at opposite sides thereof, a hammer mounted on each of said pins and capable of sliding with respect thereto, and a coil spring disposed around each pin between the arm and hammer to regulate the movement of the hammer on the pin.

3. In a gong ringing mechanism, a shaft

pivotally mounted on a support, a rigid arm mounted on said shaft, pin means attached to the free end of said arm and projecting from the opposite sides thereof, a hammer mounted on each of said pin projections and capable of sliding movement with respect thereto and spring means interposed between the arm and each hammer for regulating the movement of the hammers on the pin projections.

In witness whereof, we hereunto subscribe our names this 8th day of July, 1926.

JOHN T. MILLER.
MICHAEL HANLEY.