Nov. 18, 1924. 1,516,260

F. W. WOOD

INCLOSED DIAPHRAGM BUZZER

Filed Aug. 7, 1919

Fig. 1.

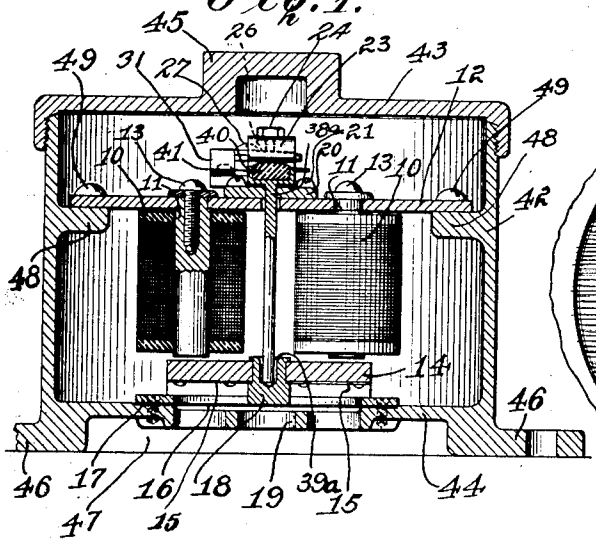


Fig. 4.

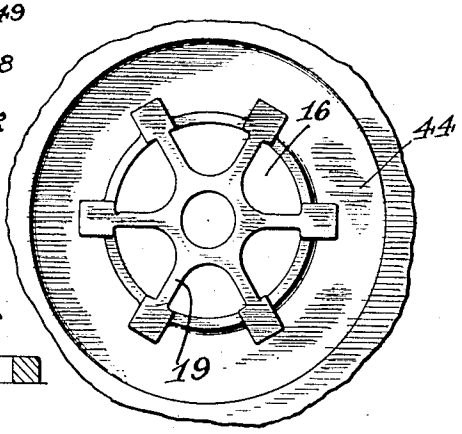


Fig. 2.

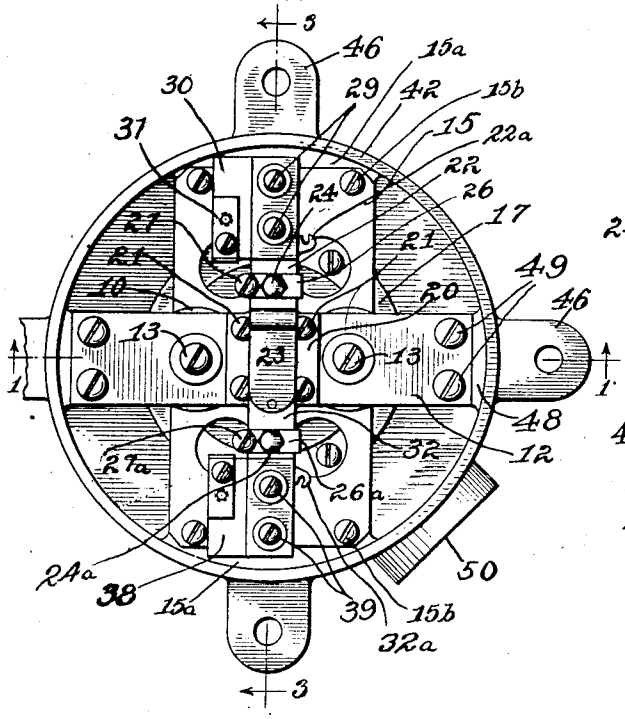
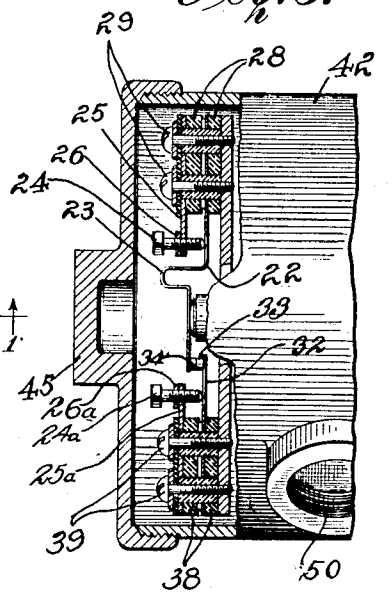


Fig. 3.



INVENTOR

Frank W. Wood

BY

Meyers, Cushman & Rea

ATTORNEY

Patented Nov. 18, 1924. 1,516,260

UNITED STATES PATENT OFFICE.

FRANK W. WOOD, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO CHARLES CORY & SON, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

INCLOSED-DIAPHRAGM BUZZER.

Application filed August 7, 1919. Serial No. 316,001.

To all whom it may concern:

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Inclosed-Diaphragm Buzzers, of which the following is a specification.

My invention relates to electro-mechanical apparatus for producing sound and particularly to buzzers of the inclosed diaphragm type.

Sound producing apparatus is often desired for signal purpose in locations where operating conditions make the use of an ordinary buzzer impractical. Such locations occur particularly in factories, engine rooms, and on shipboard; and the conditions encountered include excessive moisture, foreign matter, vibration, and exposure to blows. In some places all of these conditions occur, especially on shipboard, where the buzzer is constantly subjected to the corrosive action of moisture-laden sea air and is sometimes needed in positions where it may be directly exposed to water.

In engine room locations, and sometimes in factories, the buzzer is subjected to excessive vibration which would rapidly derange a complex or sensitive construction. This is also true of buzzers for use in gun ports or turrets either on shipboard or ashore, where they are exposed to the vibration caused by the detonation of heavy guns. Buzzers located in engine rooms and factories also are often exposed to grease, dirt, dust and other foreign matter which tends to work into the mechanism and prevent its operation.

An object of my invention is to provide a buzzer which may be subjected to the hardest usage, especially under the conditions outlined above, without becoming deranged. It is further adapted for use in confined quarters, such as commonly occur on shipboard, where the use of a sound-producing device with a horn is often objectionable because of the space occupied by the horn.

Furthermore, my buzzer is designed and arranged to produce a very loud, sharp sound which can be easily heard above the noises of engine rooms, gun ports, factories, and similar locations. It is also compact, so that it may be placed in out-of-the-way locations and is protected so than none of the working parts are exposed to chance blows.

I have also arranged the working parts in units, and have connected them to each other and to the casing of the buzzer so that they may readily be removed as a complete unit when the buzzer is inaccessible, and repaired in a convenient location without detaching the entire buzzer from its position.

I have also provided an improved construction which is adapted to be mounted on bulkheads or similar places so as to use the structure on which it is mounted to form a sounding board for the amplification of the sound waves from the buzzer.

Further objects and advantages of my construction will be apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical cross-sectional view of the buzzer, one magnet being shown in section, the other in plan view,

Figure 2 is a top plan view with the casing cover removed,

Figure 3 is a fragmentary side plan view with the upper portion of the casing broken away showing part of the mechanism in transverse section at right angles to that of Figure 1, and

Figure 4 is a fragmentary bottom plan view.

My buzzer may include a number of magnets 10, preferably two in number, which may be mounted adjacent and parallel to each other in any desired way, such as by attaching a reduced portion of cores 11 removably in a suitable aperture in yoke 12 as by screws 13. An armature 14 is removably mounted adjacent the poles of magnets 10 in any suitable manner, preferably by a flexible plate 15 attached to the armature 14 and mounted on the buzzer casing, to hold the armature in fixed position and prevent its being disarranged even under the heaviest vibration. Plate 15 may be mounted on the casing by providing lugs 15^a and screws 15^b for attaching the plate to the lugs. Plate 15 may be cut away in part or otherwise shaped to permit armature 14 sufficient freedom of motion.

Directly under and adjacent to the armature 14 is located a diaphragm 16, which preferably is tightly stretched across an

aperture in the buzzer casing and is held in position in any desired manner, such for instance, as by a removable clamping ring 17 screwed to the casing. Mounted on the armature 14 is a hammer button 18 arranged to be normally in contact with diaphragm 16. Preferably, hammer button 18 is in the form of a stud passing through the armature and held in position in any desired way, such as by slightly expanding the upper edge thereof. A perforated covering may, if desired, be mounted across the aperture in the casing to protect the diaphragm 16 from chance blows. This may be in the form of a spider 19 either cast integral with or attached to the casing in any desired manner.

My buzzer is primarily intended for use with direct current though the mechanism hereinbefore described will by itself, be operative if used with alternating current. For the former use, I provide a vibrating interrupter in the magnet circuit and have constructed and arranged the vibrator of the interrupter so that it is also operative to return the armature to its normal position after the circuit has been broken. The vibrator mechanism is preferably mounted as a unit. In the form shown, I utilize a carrier plate 20 which preferably lies transverse to and is mounted upon yoke 12 as by screws 21. At one end of the carrier plate, I mount vibrator finger 22 extending across the centre of the junction between yoke 12 and carrier plate 20 and preferably having a reverse bend 23 to increase its resiliency.

I provide means for regulating the position of finger 22, said means preferably consisting of a screw 24 bearing on finger 22. Any desired method of locking screw 24 in position may be utilized such as a jam nut, but I have shown a short locking plate 26 through which screw 24 is threaded. It will be apparent that by normally having plate 26 and plate 25 slightly spaced where screw 24 passes through them, screw 24 may be clamped in adjusted position by tightening clamping screw 27 passing through plate 26 and threaded into an extension on plate 25. By this means, adjusting screw 24 is held so firmly in position that even excessive vibration will not shift it. Plate 25 and finger 22 are preferably separated by blocks of insulation 28 and are held in position by insulated screws 29. For convenience, I may provide a connection plate 30 adjacent finger 22 and held in position by screws 29, plate 30 having mounted thereon a suitable terminal 31 for one of the circuit wires.

At the opposite end of carrier plate 20 is mounted a spring contact finger 32 extending toward the centre of said carrier plate and having a contact point 33 mounted on its inner end and located so as to rest normally against a similar contact point 34 on the extremity of spring finger 22. Mounted above spring finger 32 is a plate 25^a carrying adjusting screw 24^a having its lower end in contact with finger 32. The same construction of adjusting mechanism is provided for the spring finger 32, as is provided for the finger 22, the parts being indicated by the reference characters 24^a, 25^a, 26^a and 27^a, the said mechanism being suitably insulated by a block 38 and held in position by insulating screws 39.

It will be noted that spring finger 22 extends across the point of junction of yoke 12 and carrier plate 20, and contact points 33 and 34 are located at one side of the junction.

I provide means for utilizing spring finger 22 to press armature 14 away from the magnets 10 and toward the diaphragm 16. This may consist of a plunger rod 38^a sliding in suitable apertures through carrier plate 20 and yoke 12 at approximately the centre of their junction, the lower end of plunger rod 38^a being operatively positioned to press armature 14 downwardly. Various connections for the ends of rod 38^a may be provided, the construction being such that the plunger rod may, if desired, be fixed at its lower end to the armature structure; but for convenience in assembling and removing part or all of the mechanism for repairs, I prefer to provide a loose connection at the lower end of the plunger rod. This may be done in several ways. I prefer to provide a socket 39^a in hammer button 18, the lower end of plunger rod 38^a resting loosely in socket 39^a so as to bear against the bottom of the socket, but being easily removable therefrom. The upper end of plunger rod 38^a carries an insulating element 40 preferably in the form of a button carried by a cup-shaped holder 41 formed on the upper end of plunger rod 38^a. Button 40 bears against the lower face of spring contact finger 22 which serves to press plunger rod 38^a downwardly and thereby to force the armature 14 away from magnets 10.

I provide a water-tight casing for the buzzer. This casing may be constructed in numerous ways, but preferably consists of a cylindrical wall 42 having ends 43 and 44. Diaphragm 16 is mounted in one end such as 44, and the ends are attached to side wall 42 so as to form a completely water-tight casing which will effectively protect the buzzer mechanism above described from dirt, grease, oil, dust, moisture, and even water. One end of the casing, either the end containing the diaphragm or the opposite end, is preferably removable to render the buzzer mechanism accessible. I have shown end 43 in the form of a cap threaded on the end of side wall 42, and preferably

having a ground joint therewith to make the connection water-tight. A flat-sided knob 45 is preferably formed in the central part of cap end 43 to provide wrench-engaging means for tightening or removing the cap. The casing is adapted to be mounted with diaphragm 16 adjacent the base upon which the buzzer is mounted, and I have provided mounting means whereby the buzzer may be located adjacent to but slightly spaced from the base which is preferably a bulkhead or other medium capable of some vibration; and I have provided a space around the bottom of the casing through which the sound from the diaphragm reflected by the base may escape. To produce this result, I preferably provide a plurality of downwardly extending lugs 46 adapted to be screwed or otherwise attached to the base, and leaving spaces 47 between the casing and the base intermediate adjacent lugs. For convenience in removal of the operative portion of the buzzer, I preferably mount yoke 12 detachably upon the inside of the casing. This may be done in different ways, but I preferably provide lugs 48 on said side wall and detachably mount the ends of yoke 12 thereon as by screws 49.

I have also shown the side wall 42 as provided with a shouldered aperture 50 into which may be threaded the end of a conduit for leading in the circuit wires; but any other preferred form of lead-in may be provided.

In operation, the energizing of magnets 10 will draw armature 14 upwardly and raise hammer button 18 out of contact with diaphragm 16. This motion will also move plunger rod 38^a upward, raising the end of spring contact finger 22 and separating contacts 33 and 34, thereby breaking the circuit and deenergizing magnets 10. Armature 14 will thereupon spring back into place, being aided therein by the pressure of plunger rod 38^a which is forced downward by the resiliency of spring finger 22. This return motion will bring hammer button 18 sharply down into contact with diaphragm 16, but the moment the diaphragm is struck, contacts 35 and 34 will be again brought into contact with each other, and the magnet circuit reestablished, so that the hammer button will be retracted as the armature is immediately raised again. The contact point may be adjusted by manipulation of adjusting screw 24^a, and the pressure of spring contact finger 22 on plunger rod 38^a may be varied by manipulation of adjusting screw 24 so that the operation of the buzzer is susceptible of simple and thorough adjustment. Hooks 22^1 and 32^a may be provided on members 22 and 32, respectively, for easily inserting and securing conductor-wires.

It will be noted that the buzzer is constructed on what may be called a unit system to facilitate assembly and removal for repair. Yoke 12 carries practically the entire operative mechanism and carrier plate 20 detachably mounted thereon carries the complete interrupter mechanism. Yoke 12 is readily detached and removed by taking out screws 49, and carrier plate 20 can be removed without disturbing the rest of the mechanism by taking out screws 21. It will be apparent that any derangement of the parts may be repaired, and any renewal that is necessary is facilitated, particularly where the buzzer is in an inaccessible position, without removing the buzzer casing from its base.

It will be apparent that the construction is unusually simple, and all moving parts are positively and strongly held in position, but are so arranged as to be readily removable and replaceable without taking down the entire structure. Furthermore, the buzzer is extremely compact and at the same time is unusually loud, as the muffling effect of a water-tight casing, which has been one of the chief difficulties with the inclosed type of buzzer, has been entirely avoided by the provision of the ample diaphragm, the use of the mounting as a sound board, and the provision of ample space for the sound waves to emerge.

It is to be understood, however, that the construction described, while it is the preferred form of my invention, is subject to many variations and modifications aside from those indicated, and I do not consider my invention to be limited to the construction shown except as my invention is defined by the scope of the claims.

I claim:

1. In sound producing apparatus, an armature, sound producing means actuated by the armature, a yoke, a magnet mounted on the yoke adjacent the armature so that the energizing of the magnet will shift the armature from its normal position, a carrier frame mounted transversely on said yoke, the longitudinal centres of said carrier frame and yoke being approximately in register, a resilient element mounted at one end adjacent the end of the carrier frame and extending across said registering centres, a yieldable element mounted at one end adjacent the opposite end of the carrier frame and extending toward said centres into juxtaposition with the inner end of the resilient element, cooperating contact points carried by the adjacent ends of the resilient and yieldable members connected in circuit with the magnets, a plunger rod slidably mounted through the carrier frame and yoke adjacent said centres, one end of the plunger engaging the armature and the other being engaged by the resilient element, the construction being such that the energizing of

the magnets shifts the armature, moving the reciprocating element to shift the resilient finger and breaking the contact, said finger then returning the armature to its normal position by pressure on the reciprocating element, and simultaneously closing the magnetic circuit.

2. In sound producing apparatus, a casing including a sound-producing diaphragm at one end, a removable closure at the opposite end, and supporting portions projecting inwardly between the said ends, a yoke detachably secured to the supporting portions of the casing on the end next to the closure for the latter, a magnet attached to the yoke, an armature movably mounted near the magnet and adapted to be attracted by the same, means connected to the armature for vibrating the diaphragm when the magnet is intermittently energized, a supporting element detachably secured to the yoke on the end next the casing closure, and circuit-breaking means for the magnets attached to the said supporting element as an independently removable unit.

In testimony whereof I have hereunto set my hand.

FRANK W. WOOD.