March 17, 1959 J. H. HAM, JR., ET AL 2,878,464

SOUND OUTPUT CONTROLLER FOR SIGNALING DEVICES

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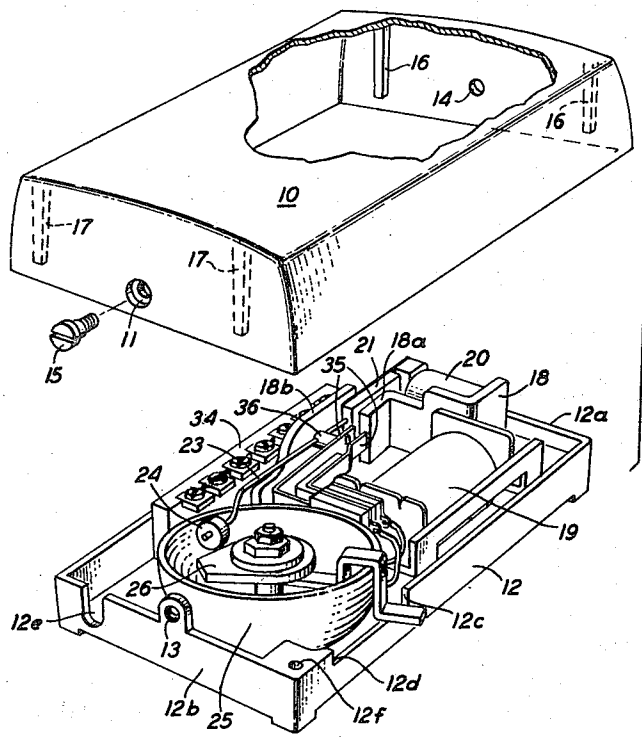

FIG. 1

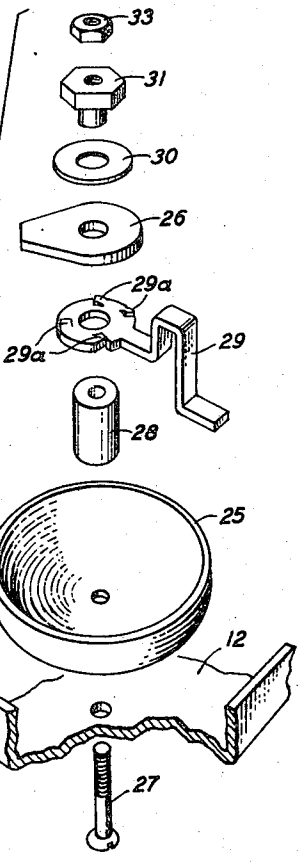

FIG. 2

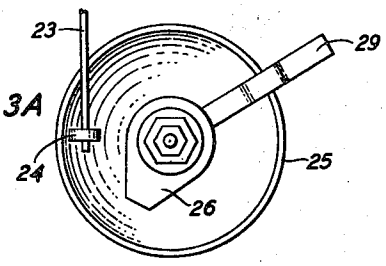

FIG. 3A

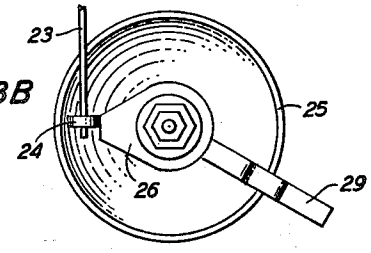

FIG. 3B

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SOUND OUTPUT CONTROLLER FOR SIGNALING DEVICES

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7 Claims. (Cl. 340—400)

This invention relates to ringers, and more particularly to sound output control means therefor.

Sound output regulators for ringers of the percussion type are well known. For example, Patent 2,468,474, W. E. Whidden, April 26, 1949, discloses a two-gong telephone ringer in which a subscriber-controlled mechanism adjusts the spacing between the two gongs while simultaneously regulating the amplitude of the stroke of a clapper rod. Also, Patent 2,733,435, H. A. Bredehoft, January 31, 1956, discloses a telephone ringer having a gong, an electromagnetically-controlled vibratile armature member, a flexible rod, an eccentrically-shaped clapper carried by the flexible rod in juxtaposition to the gong, a structural arrangement associated with the flexible rod for rotating the clapper to vary the clearance between the gong and the clapper, an interconnecting structure including a rod staked to the armature for communicating armature vibrations to the flexible rod, and means controlled by the clapper-rotating structural arrangement for adjusting the stroke of the armature.

An object of this invention is an improved signaling device.

More specifically, an object of the present invention is an improved sound output regulator for a signaling device.

Another object of the present invention is a subscriber-controlled output regulator for an audible signaling device.

A further object of this invention is a rugged, trouble-free regulator mechanism having mechanical elements that may be economically manufactured and easily assembled.

A still further object of the present invention is a ringer sound regulator which minimizes changes in the sensitivity of operation of the ringer throughout the entire range of adjustment of the regulator.

These and other objects of the present invention are realized in an illustrative embodiment thereof wherein a gong having therein a centrally-mounted rotatable cam member includes a clapper element disposed between the cam and the inner surface of the gong. Rotation of the cam, which is effected by means of a readily accessible lever arm, varies the clapper-to-cam distance, and thereby the sound output of the gong.

Thus, a feature of this invention is a ringer comprising a gong, a clapper for striking the inner surface of the gong in a sound-producing manner, and a readily rotatable cam positioned within the gong for selectively limiting the movement of the clapper, whereby the sound output of the ringer can be controlled by adjustment of the cam.

A ringer device having a regulator of the type illustrative of the principles of this invention formed as a component part thereof exhibits an ease of sound output adjustment that is highly advantageous from the standpoint of user convenience. Additionally, the rugged modular-type construction of such a regulator possesses significant maintenance and manufacturing advantages.

A complete understanding of this invention and of the above and other features and advantages thereof may be gained from a consideration of the following detailed description in conjunction with the accompanying drawing, in which:

Fig. 1 is a partially exploded perspective view of a ringer device including a regulator illustrative of the principles of the present invention;

Fig. 2 is an exploded perspective view of the specific regulator structure shown in Fig. 1, showing also a portion of the ringer base and the means by which the regulator is secured thereto; and

Figs. 3A and 3B are plan views of the gong of Fig. 1, showing the regulator associated therewith arranged in its loudest and zero sound output positions, respectively.

The illustrated ringer assembly of Fig. 1 includes a cover **10** having a counterbored opening **11** in one end wall thereof, and a single diameter opening **14** in the opposite end wall.

The cover **10** of the assembly of Fig. 1 is designed to be secured to a base member **12**. The single diameter opening **14** in the cover **10** is intended to receive a stud or cylindrical element (not shown) which is formed integrally with the base **12** and projects out from the end portion **12***a* thereof in approximate longitudinal alignment with a threaded aperture **13** in the end portion **12***b*.

With the base stud disposed in the cover opening **14**, a screw member **15** is employed to fasten the cover **10** to the base **12** in a mechanically secure fashion. The cover **10** is not rotatable about its axis of restraint because rib members or feet **16** and **17**, which project out from the inner surface of the cover, rest on the upper faces, respectively, of the base portions **12***a* and **12***b* when the cover is secured in place as described above.

The secured cover **10** overhangs the base **12** in a manner such that spaces are provided between the cover and base. These spaces enable ringer-emitted sound to efficiently pass out from the ringer enclosure to the air surrounding the assembly.

Arranged on the base **12** is a pole piece member **18**, advantageously of magnetic iron. Also arranged thereon is a spool wound coil **19**. The coil **19** includes a core (not shown) which has end apertures through which fastening members extend to secure the coil **19** and member **18** to the base **12**.

The configuration of the member **18** and the disposition of a permanent magnet **20** and an armature assembly **21** relative thereto are substantially as disclosed in Patent 2,590,500, H. A. Bredehoft—M. S. Richardson, March 25, 1952. The disclosure of that patent is hereby incorporated herein by reference.

The pole piece member **18** includes portions **18***a* and **18***b* respectively disposed on opposite sides of the armature assembly **21**. That part of the assembly **21** which is included between the portions **18***a* and **18***b* may advantageously include an aperture therethrough (not shown) in which is securely mounted a rubber bumper element having a grommet-like configuration (not shown). The bumper element serves to minimize the noise produced by the armature in striking the pole piece portions **18***a* and **18***b*.

Staked to the armature assembly **21** is a clapper rod **23** which has swaged on the free end thereof a clapper element **24**. The element **24** is positioned within a gong **25** between a cam or disc **26** and a portion of the inner surface of the gong **25**.

The means by which the cam **26** is mounted within the gong **25** is seen clearly in Fig. 2. The mounting means includes a screw member **27** (which extends through a portion of the base **12**), a post **28**, a lever **29**, a washer **30**, a bushing **31** and a nut **33**.

The lever arm **29** comprises an apertured end having raised portions **29***a* which are intended, in an assembled mounting, to bite into the undersurface of the cam **26**, thereby insuring that the element **26** will turn in correspondence with movement of the subscriber-controlled arm **29**.

Fig. 3A shows the arm **29** and cam **26** in the loudest sound output position possible with the ringer assembly of Fig. 1.

Fig. 3B shows the elements **29** and **26** arranged in the zero sound output position. It is, of course, obvious that a very large number of adjustments between the extreme positions shown in Figs. 3A and 3B are possible with a sound regulator illustrative of the principles of the present invention.

Referring again to Fig. 1, there is shown a cut-out portion of the base **12**. This portion includes side walls **12***c* and **12***d* which limit the excursion of the lever **29** and respectively provide stops for the loudest and zero sound output positions thereof.

In operation, the armature **21** of the illustrated ringer assembly is electromagnetically moved to cause the clapper **24** to move to the right (Fig. 3A) into contact with the cam **26**, which advantageously may be of rubber. The clapper **24** then bounces back from the cam **26** and moves to the left during the release stroke of the armature into sound-producing engagement with the gong **25**.

In the zero sound output position (Fig. 3B), the elements **24** and **26** are arranged in contacting relationship. Thus, energization of the ringer assembly cannot cause movement of the clapper **24** to the right and, accordingly, the ringer produces no sound output for the lever position shown in Fig. 3B.

The assembly shown in Fig. 1 also includes a terminal block **34** which is accessible through an aperture (not shown) on the underside of the base **12**, as well as from the top or gong-mounting side thereof.

The assembly further comprises a set of contact springs **35** mounted by one of the above-mentioned spool core fasteners to the base **12**. The springs carry thereon an insulating stud element **36** which bears against the clapper rod **23**. As the armature **21** is moved, the stud **36** displaces the arrangement of contact springs **35**, thereby providing contact closure and interruption at the same frequency as that of the applied ringing signal.

Also shown in Fig. 1 are a base port **12***e* through which, for example, conductors to the terminal block **34** may extend, and a corner opening **12***f* which, with a diagonally opposite base opening (not shown), may be employed to secure the base **12** to any suitable mounting member.

The specific illustrative sound output regulator described herein is especially advantageous in that adjustment of the cam **26** between extreme sound output positions does not affect the operate sensitivity of the depicted ringer assembly. In other words, the sound output of the ringer may be effectively controlled without influencing the level of energization at which the armature **21** is moved from its rest position. This is so because sound output adjustment of the described structure does not involve varying the position of the armature with respect to the pole piece **18**.

It is to be understood that the above-described arrangements are illustrative and not restrictive of the principles of the present invention. Other arrangements may be devised by those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. In combination in a sound-producing device, a gong, a rotatable cam mounted within said gong, a clapper disposed between an edge of said cam and an inner portion of said gong, means for moving said clapper into contact with said cam edge, whereby said clapper rebounds from said cam and then strikes said gong inner portion in a sound-producing manner, the level of said sound being dependent on the adjustment of said rotatable cam.

2. In combination, gong means, cam means, clapper means within said gong means for striking said cam means and then an inner portion of said gong means in a sound-producing manner, said cam means being movable so as to vary the clapper means-to-cam means distance and thereby the sound output level of said combination.

3. In combination, gong means, cam means, clapper means positioned between said gong means and said cam means, means for moving said clapper means into contact with said cam means, means for moving said cam means so as to vary the clapper means-to-cam means distance, whereby said clapper means strikes said cam means and then, in rebounding therefrom, said gong means in a sound-producing manner.

4. In combination in a telephone ringer, gong means, rotatable disc means eccentrically mounted within said gong means, an electromagnetically actuable clapper disposed within said gong means between an edge of said disc means and an inner portion of said gong means, whereby movement of said clapper causes said clapper to strike said disc means edge and then, in rebounding therefrom, said inner gong means portion in a sound-producing manner.

5. A sound-producing device comprising a gong, clapper means positioned within said gong in closely adjacent relationship to an inner portion thereof, means for moving said clapper means from its rest position toward the center of said gong, and resilient rotatable cam means centrally mounted within said gong for selectively controlling the extent of movement of said clapper means, whereby said clapper rebounds from said cam means when moved into contact therewith and then strikes said gong inner portion in a sound-producing manner, the level of said sound being dependent on the position of said cam means.

6. A ringer comprising a gong, a clapper, a cam, said cam being rotatably mounted within said gong, said clapper being disposed within said gong adjacent to an edge of said cam, and means for exerting a force on said clapper so as to move it into contacting relationship with said edge, whereby said clapper rebounds from said cam and strikes said gong in a manner whose sound intensity depends on the position of said rotatable cam.

7. In combination in a telephone ringer, a gong, resilient cam means mounted within said gong, clapper means positioned within said gong between an edge of said cam means and an inner portion of said gong, means for moving said clapper means into contact with said edge, whereby said clapper means rebounds from said edge and strikes said gong inner portion in a sound-producing manner, and means for rotating said cam means, whereby the clapper means-to-edge distance and thereby the sound output level of said ringer may be varied.

No references cited.