April 26, 1949. W. E. WHIDDEN 2,468,474

SOUND REGULATOR FOR TELEPHONE RINGERS

Filed Feb. 7, 1948

FIG. 1

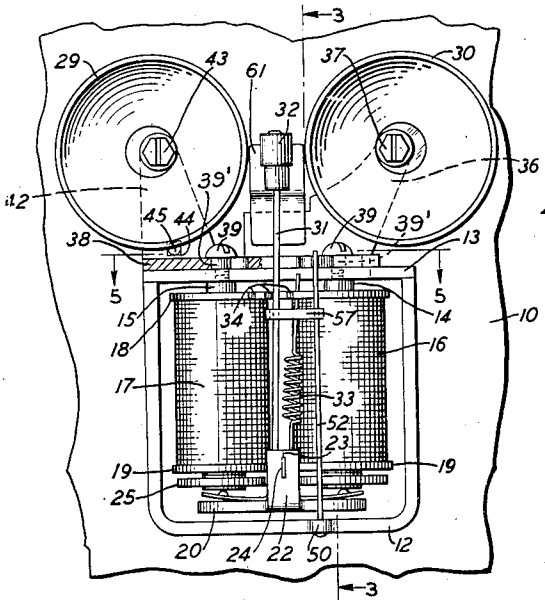


FIG. 2

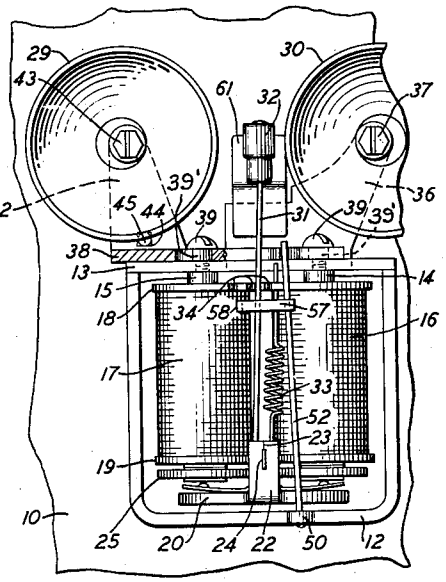


FIG. 3

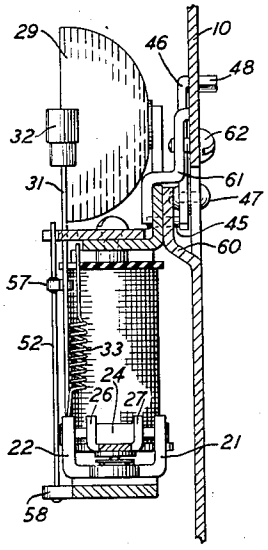


FIG. 4

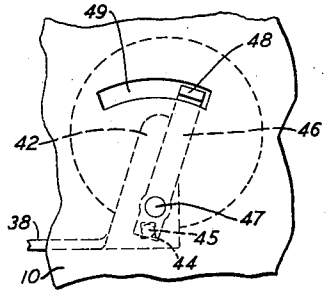
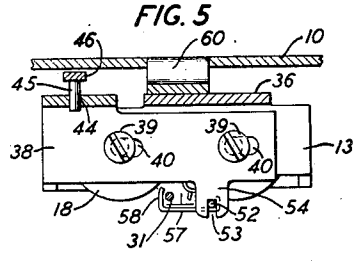


FIG. 5



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SOUND REGULATOR FOR TELEPHONE RINGERS

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10 Claims. (Cl. 177—7)

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This invention relates to audible signaling devices of the percussion type and particularly to improvements in sound regulators for telephone ringers.

The audible signaling device commonly used at telephone subscribers' stations is generally known as a telephone ringer. This device comprises an electromagnetically-controlled, vibratable clapper rod which supports a clapper between two spaced gongs so that as the rod is vibrated the clapper strikes the gongs alternately to produce a sound signal. In practice, each gong is struck by the clapper on the overthrow of the clapper rod. That is, after the rod reaches its maximum swing, in either direction, as determined by the amplitude of the stroke of the magnet armature to which the rod is staked or otherwise fixed, the resiliency of the rod and the inertia of the clapper cause the clapper-supporting end of the rod to continue in the direction of the gong after the movement of the armature has been arrested or its direction reversed. This "snap" action, or overthrow of the rod which insures substantially immediate rebound of the clapper ball after impact with the gong produces a clear, resonant and undamped sound signal.

Attempts have been made heretofore to provide the telephone subscriber with a ringer, the sound output of which could be muffled or otherwise adjusted to satisfy the desires of the subscriber. Known efforts in this direction have resulted in signaling devices in which the sound level could be adjusted between upper and lower limits only at the expense of clarity of tone unless the adjustment was made by an experienced maintenance man.

It is the object of this invention to provide a sound regulator for telephone ringers which is subscriber-controlled and which insures a uniform high quality of tone regardless of the sound level at which the ringer is adjusted to operate.

This object is attained in accordance with a feature of the invention by the provision of subscriber-controlled means for adjusting the spacing of the ringer gongs and for simultaneously regulating the amplitude of the stroke of the clapper rod. More particularly, one of the ringer gongs is mounted on a movable support with which a stop for the clapper rod is mechanically coupled, and manually operable means is provided for moving the said gong support relative to a fixed bracket which supports the other gong. Thus the spacing between the gongs and between the stop and the clapper rod may be simultaneously adjusted at the will of the subscriber in a manner such that any variation in the gong spacing is accompanied by a corresponding variation in the spacing between the clapper rod and its stop. Regulating the amplitude of the clapper rod stroke in accordance with the spacing between the ringer gongs in this manner insures the striking of the gongs by the clapper ball during the overthrow of the clapper rod and precludes the possibility of the clapper acting to damp the gong vibrations even at small amplitude strokes of the clapper rod.

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The invention will be better understood from the following detailed description when read with reference to the accompanying drawings, in which:

Fig. 1 is a top plan view of a ringer involving the features of this invention and shows the sound regulating mechanism adjusted for low level sound output;

Fig. 2 is a view similar to that of Fig. 1 showing the sound regulating mechanism adjusted for maximum sound output;

Fig. 3 is a sectional view of the ringer taken along the line 3—3 of Fig. 1 looking in the direction of the small arrows;

Fig. 4 is a fragmentary view of the base of a telephone set showing, partly in outline, a manually operable lever employed in regulating the sound output of the ringer; and

Fig. 5 is a sectional view of the ringer taken along the line 5—5 of Fig. 1 looking in the direction of the small arrows.

The method of sound regulation which constitutes the subject-matter of the instant invention is applicable to any type of ringer involving clapper-actuated gongs. The ringer structure disclosed in the drawings is by way of illustration only and is not intended to impose any limitations on the scope of the invention other than those recited in the appended claims. The ringer structure, per se, which has been chosen for descriptive purposes follows well-known design principles and is fully disclosed and described in United States Patent 2,082,095, issued June 1, 1937 to H. A. Bredehoft. It consists essentially of a U-shaped permanent magnet 12 poled as indicated in Fig. 5 of United States Patent 2,269,108, issued January 6, 1942 to J. D. Hubbell et al. and to the extremities of which a cross bar 13 is welded or otherwise suitably secured; a pair of magnet cores 14 and 15 depending from and fixed in spaced relation on the cross bar 13; coils 16 and 17 carried by the said cores 14 and 15 respectively between spoolheads

18 and 19; an armature 20 having front and rear integral right angular extensions 21 and 22 which are provided with slots 23 into which the ends of an armature mounting spring 24 are fitted; a yoke piece 25 comprising two annular portions and an interconnecting integral portion having oppositely disposed right angular extensions 26 and 27 having slots aligned with the slots 23 in the armature extensions 21 and 23 for the accommodation of the armature mounting spring 24; a pair of gongs 29 and 30; a clapper rod 31 staked at one end to the armature extension 22 and carrying a clapper ball or its equivalent 32 at the other end; and a biasing spring 33 having one end staked to the armature extension 22 and the other end engaged in one of three notches 34 located on the forward edge of the insulating element 18. The yoke 25 is force-fitted on enlarged lower ends of the cores 14 and 15 thus providing a rigid mounting for the armature.

The cross bar 13 is provided with an integral radially projecting arm 36 the plane of which is at right angles to the plane of the cross bar itself. At the outer end of the arm 36 the gong 30 is mounted in any suitable manner as by the screw 37. The arm 36 provides a stationary support for the gong 30.

A slotted rectangularly shaped member 38 is slidably mounted on the outer face of the cross bar 13 by means of screws 39 which pass through suitably tapped elongated slots 40 in the member 38 and aligned tapped holes in the cross bar 13 and in the cores 14 and 15. Each screw 39, as clearly disclosed in Figs. 1 and 2, is provided with a shoulder 39' which abuts the upper face of the cross bar 13 and is of such depth as to provide just enough clearance between the undersurface of the screw head and the outer face of the member 38 to permit the latter to be slid laterally freely. When the screws 39 are screwed into the tapped holes in the upper ends of the cores 14 and 15 the cores are drawn up tightly against the underface of the cross bar 13, the upper face of which is tightly engaged by the underedges of the screw shoulders 39'. Thus it is that screws 39 serve not only to support the cores 14 and 15 on the cross bar 13 but they also cooperate with the slots 40 to permit a limited sliding movement of the member 38 relative to the cross bar 13. The slidable member 38 is provided with an integral right angular extension 42 upon the outer end of which the gong 29 is fixed by means of screw 43. The element 38 and its extension 42 constitute a movable support for gong 29.

The extension arm 42 is provided with an aperture 44 into which projects a pin 45 which is fixed to the lower end of a lever 46. The lever 46 is mounted for pivotal movement about the bolt 47 which positions the lever on the base plate 10. A right angular extension 48 of lever 47 projects through an arcuate slot 49 in the plate 10 whereby the lever may be manually operated about the pivot 47. It is apparent that actuation of the lever 46 causes the gong mounting 38—42 to be moved relative to the stationary arm 36 and the spacing between the gongs 29 and 30 to be varied accordingly.

An integral lug or projection 50 is formed on the base of the U-shaped magnet 12 which is apertured to receive one end of a rod 52, the other end of which rests in a slot 53 in the lateral lug or projection 54 formed integrally with the slidable gong mounting 38—42.

Intermediate its extremities the rod 52 has fixed thereto an L-shaped stop 57 which projects

at right angles therefrom in the direction of the clapper rod 31, so as to position its shorter leg 58 in the line of travel of the clapper rod. The distance between the stop leg 58 and the clapper rod 31 is varied as the spacing between the gongs 29 and 30 is varied, it being apparent that because of the location of the upper end of the rod 52 in the slot 53 of the slidable gong mounting 38—42 any movement of the latter under control of the lever 46 is communicated to the stop 57—58. Thus the amplitude of the stroke of the clapper rod may be and is adjusted simultaneously with the adjustment of the gong spacing.

With reference to Fig. 1 it will be observed that for relatively small spacing of the gongs the stop arm 58 is in a position of close proximity to the clapper rod 31. The permissible swing of the clapper rod is correspondingly small and the sound level of the signal emitted by the gong 29 incident to the impact of the clapper 32 therewith relatively low. It will be observed further, however, that the movement of the clapper rod 31 is checked by the stop arm 58 just prior to the engagement of the clapper 32 with the gong 29 so that actually the gong is struck on the overthrow of the clapper rod insuring a clear, undamped sound signal.

Similarly and with reference to Fig. 2, a relatively large spacing of the gongs 29 and 30 is accompanied by a correspondingly increased separation of the clapper rod 31 and the stop arm 58 so that the amplitude of the clapper rod stroke is increased and a sound signal of greater intensity produced. As in the case of the low amplitude strokes of the clapper rod, the gong 29 is struck on the clapper rod overthrow to insure a clear, undamped signal of relatively great intensity.

The ringer may be removably mounted on the base plate 10 in any convenient manner. As illustrated, a cut-away portion 60 of the plate 10 is given an inward offset to provide a support against which the inner portion of the fixed gong mounting 36 is clamped by means of the clamp 61 and the screw 62.

What is claimed is:

1. The combination in a telephone ringer, of a pair of spaced gongs, a resilient clapper rod carrying a striker adapted to engage said gongs alternately when said rod is vibrated, means for vibrating said clapper rod, and means for adjusting the spacing between said gongs and for simultaneously regulating the amplitude of the stroke of said clapper rod.

2. A sound signal comprising a gong, a vibratable hammer for striking said gong, a stop for said hammer, and means for moving said stop and said gong simultaneously relative to said hammer.

3. A sound signal comprising a gong, a clapper, a rod supporting said clapper and movable in the direction of said gong, and an adjustable stop for said rod.

4. In a telephone ringer, a gong, an electromagnetically controlled, vibratable armature, a clapper, a rod staked to said armature and supporting said clapper in the vicinity of said gong, a stop for said rod, and means for moving said stop relative to said rod.

5. In a telephone ringer, the combination of a gong, an electromagnetically controlled vibratable, armature having a predetermined maximum stroke, a clapper rod staked to said armature for movement therewith in the direction of said gong, and means interposed in the line of travel of said rod for checking said rod in its movement in

the direction of said gong before said armature reaches its maximum stroke.

6. In a telephone ringer the combination defined in the preceding claim in which the said interposed means is adjustable.

7. In a telephone ringer, a gong, a clapper, a vibratable rod supporting said clapper in spaced relation to said gong, a stop for said rod, and means for automatically regulating the position of said stop relative to said rod in accordance with the spacing between said clapper and said gong.

8. In a telephone ringer, a gong, a clapper, a vibratable rod supporting said clapper in spaced relation to said gong, means for adjusting the position of said gong relative to said clapper, a stop for said rod, and means controlled by said first said means for adjusting the position of said stop relative to said rod.

9. In a telephone ringer, a gong, a striker for said gong, an adjustable mounting for said gong,

and means operated by said mounting for regulating the amplitude of the stroke of said striker.

10. A telephone ringer having a multiposition gong, a striker for said gong, and means for adjusting the amplitude of the stroke of said striker automatically for each position of said gong.

WILLIAM E. WHIDDEN.

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