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D.G. BLATTNER

2,209,382

TELEPHONE RINGER

Filed March 10, 1937

FIG. 1

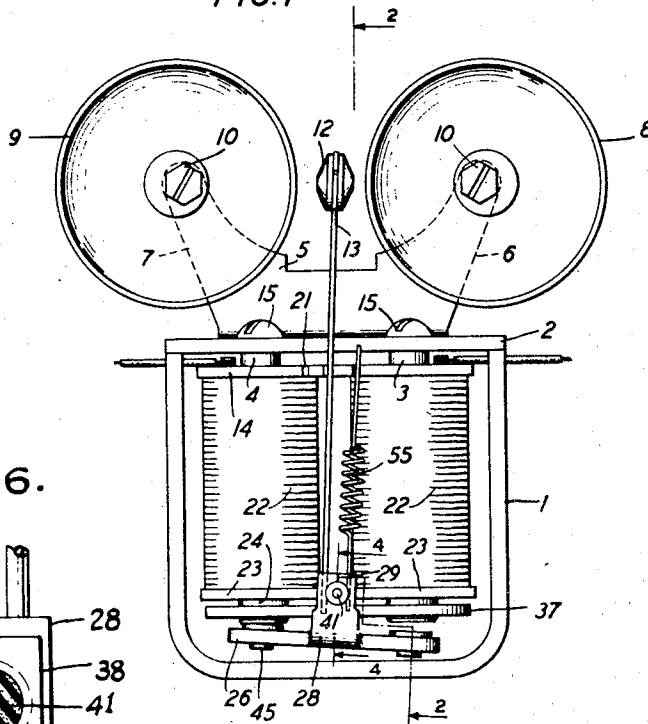


FIG. 6.

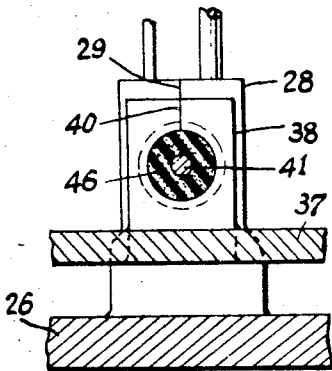


FIG. 2

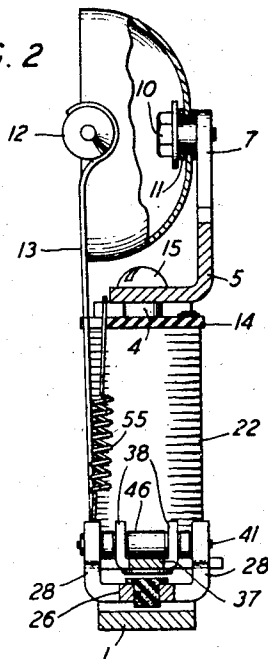


FIG. 3

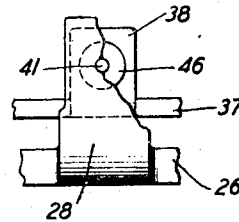


FIG. 5

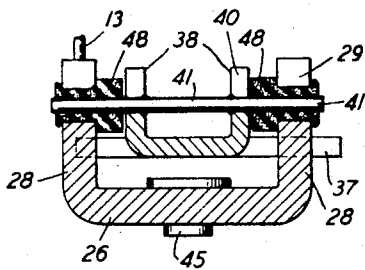
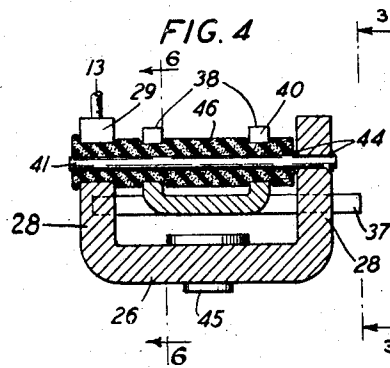


FIG. 4



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TELEPHONE RINGER

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4 Claims. (Cl. 177-7)

This invention relates to electromagnetically operated devices and particularly to electromagnetically operated signaling devices of the type commonly known as telephone ringers.

The telephone ringer in general use today comprises essentially, an electromagnet which when energized causes the operation of an armature to which there is staked, or otherwise secured, a striker-rod whose free end extends between two gongs in such a manner as to strike the gongs alternately when the electromagnet is energized.

The armatures of such devices have been supported heretofore on a stationary yoke piece either by means of shafts, metallic pivots or through the medium of a reed-type hinge. Such methods of support, though satisfactory in the past, do not meet present-day requirements. In current telephone designs such supports are not sufficiently rugged to withstand long periods of service without adjustments, are affected by the environment of dirt and dust, require lubrication and, in shaft and pivot constructions, present an impedance to desired armature motion which varies with time due to wear.

Also, in current telephone designs, one class of service requires a loud signal while another class requires a weak signal of pleasing tone quality and it is desirable that a single ringer design satisfy both classes.

An object of this invention is to provide an improved type of mounting for the armatures of electromagnetically operated devices and one which overcomes the inherent weaknesses of the shaft, pivot and reed types.

Another object of the invention is to render the sound output of a telephone ringer more pleasant in character by reducing the mechanical noise and to provide means whereby the volume of sound produced can be regulated to suit the user.

The improved armature support is obtained in accordance with a feature of the invention by the provision of a torsional mounting which is rugged, requires no lubrication, is unaffected by the environment of dirt or dust and which presents an impedance to desired armature motion which is substantially constant over a long period of time. More specifically, the armature is supported on its associated stationary yoke piece by means of an elastic material, such as rubber.

In accordance with another feature of the invention, the sound quality of the telephone ringer is improved by acoustically and mechanically insulating the gongs from their supports and by

cushioning the end of the armature stroke by means of resilient armature stops instead of the rigid metal stops heretofore employed. The sound power produced by the ringer may be adjusted by substituting stops of different thicknesses thereby changing the length of the armature stroke.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawing in which:

Fig. 1 is a side elevation of a telephone ringer embodying the features of this invention;

Fig. 2 is a section taken along the line 2-2 of Fig. 1 and viewed in the direction of the arrows;

Fig. 3 is an enlarged fragmentary view of the armature support employed in Figs. 1 and 2 taken along the line 3-3 of Fig. 4 and looking in the direction of the arrows;

Fig. 4 is an enlarged section taken along the line 4-4 of Fig. 1 and viewed in the direction of the arrows;

Fig. 5 is a view, similar to that of Fig. 4, of a modification of the armature support employed in the ringer illustrated in Figs. 1 and 2; and

Fig. 6 is a section taken along the line 6-6 of Fig. 4 looking in the direction of the arrows.

In the drawing, in which like numerals in the several figures identify similar parts, 1 is a U-shaped permanent magnet whose two spaced ends are joined by a cross-bar 2 of magnetic material and secured thereto, preferably by welding. Integrally associated with the cross-bar 2 is a substantially V-shaped bracket 5 having two diverging arms 6 and 7 to the ends of which are secured gongs 8 and 9 respectively, by means of screws 10. Each gong is cushioned to its respective support by means of a grommet or eyelet-shaped rubber bushing 11 which encircles the shank of screw 10 and is interposed between the bracket finger and screwhead. This element serves to insulate the gong from the mounting and causes the sound output to be predominately the pleasing quality air-born sound of the gong instead of containing those unpleasant noise components incidental to the mechanical system and transmitted through the mounting. The striker-rod 13 is staked or otherwise rigidly secured to the armature 26.

The magnet cores 3 and 4 have their upper ends abutting the cross-bar 2 and are each provided with an axial tapped bore which accommodates a screw 15. The screws 15 pass through apertures in the cross-bar 2 and are threaded into the cores 3 and 4.

A plate 14 of comparatively stiff insulating

material, such as phenol fibre, serves as a common upper spoolhead for the coils 22 and is provided with apertures through which the upper ends of cores 3 and 4 extend. Along the outer edge of plate 14 there is provided a series of notches 21 which accommodate the upper end of a biasing spring 55 whose lower end is staked into the armature. By shifting the spring end from notch to notch, the biasing of the armature may be varied.

The windings 22 of the electromagnets are wound on the cores 3 and 4 between the plate 14 and the circular spoolheads 23 located on the lower ends of the cores.

The lower end of each of the cores 3 and 4 has an enlarged portion 24 projecting below the spoolheads 23. The portions 24 are knurled with a straight knurl so that sharp, vertical spaced ribs are formed on the core ends. A yoke 37 formed of two integrally joined annular portions is force-fitted to the enlarged core ends 24 with the apertures in the annular portions accommodating the core ends. The portion of the yoke joining the two annular portions has two oppositely disposed upturned integral projections 38 each of which is split downwardly as indicated at 40.

The armature 26 which extends over the enlarged core ends 24 is provided with a pair of oppositely disposed integral projections 28, one of which is split at 29 in a manner similar to the projections 38 of the yoke piece.

A shaft or rod 41, as shown in Fig. 4, has one end staked to the unsplit armature projection 28 and the portion thereof extending to the left of the staked portion, as viewed in Fig. 4, is encased in a cylindrical sleeve 46 of rubber, the rubber being vulcanized or otherwise secured to the shaft.

Prior to the staking of the shaft 41 to the armature, the portions of the armature projections formed by the split 29 and the portions of the yoke projections effected by the splits 40 are separated or distended to allow the rubber encased shaft to be set in position and the separated portions are then squeezed together. The rubber sleeve is accordingly pinched by yoke extensions 38 as well as by the slit armature extension 28. The shaft is then staked to the armature as indicated at 44. This arrangement provides a rigid association of the shaft with the armature and a torsional coupling between the armature and stationary yoke. Any other method of securing the sleeve to the yoke such as by cementing would serve equally as well. The squeezing of the sleeve by the slitted armature projection is preferred only for mechanical reasons, there being no advantage so far as this invention is concerned in having resilient means in Fig. 4 between the armature and the shaft.

When the ringer is energized, the armature is attracted alternately to the two poles of the electromagnets and due to the fact that the armature is staked or otherwise rigidly secured to the rod 41, the latter rotates back and forth with the armature and tends to carry the sleeve 46 with it. Since the yoke and that part of the sleeve immediately adjacent thereto are stationary, it is obvious that the rubber directly between the shaft and the yoke undergoes a torsional deformation.

The shaft is preferably of such size as to make a rugged support and the composition and dimensions of the rubber sleeve can be such as to allow any desired freedom of torsional motion to the

armature. The impedance that the rubber offers to such motion is not variable with time nor does it depend upon lubrication or the environment with respect to dirt.

Each pole face of the armature 26 is provided with a rubber stop 45 to act as a cushion between the armature and core pole-pieces 24 and thereby reduces noise caused by the operation of the armature to a minimum. The heads of the stops 45 are preferably of different thicknesses for well-known reasons and either may be changed to regulate the volume of sound as desired.

In the modification shown in Fig. 5, the shaft 41 is shown staked to the yoke 37 and with a bushing 48 vulcanized or otherwise cemented to each end portion. The bushings 48 may be squeezed or pinched by the extension 28 of the armature 26. The objective is to obtain a rigid connection between the shaft and yoke and a torsional coupling of the yoke and armature.

The rod 41 and its elastic sleeve may be considered to constitute a compound shaft whose elastic fatigue is considerably lower than that of metal and which, therefore, will have a longer life of service than a metal reed used for the same purpose.

The principle of operation of the particular type of ringer selected to illustrate the invention is the same as that of the ringer disclosed in Patent 2,082,095 issued to H. A. Bredehoft. In such structures the permanent magnet 1 is so magnetized that the mid-point of the piece joining the two parallel arms will repel the north seeking pole of a compass needle so that the two ends of the armature 26 have the same polarity, that is they present like poles to the lower extremities of the cores 3 and 4. The windings 22 of the electromagnets are connected in series so that current traversing one winding will be in a downward direction when the current in the other winding is in an upward direction with the result that the lower ends of cores 3 and 4 present unlike poles to the armature ends. For example, when the lower end of core 3 is north due to the current traversing the right winding 22, the lower end of core 4 is south due to the current traversing the left winding 22 and these polarities reverse for each half cycle of the ringing current. Thus, when there is a force of attraction between the pole end of core 3 and the armature end oppositely disposed thereto, there will be a force of repulsion between the pole end of core 4 and the armature end oppositely disposed thereto. In this manner the armature 26 oscillates about its support when the windings 22 are energized from a source of signaling current.

What is claimed is:

1. In an electromagnetically operated telephone ringer, a stationary yoke, a movable armature and a compound torsional coupling between said yoke and said armature having an elastic fatigue less than metal and comprising a rubber sleeved shaft, the sleeve thereof being fixedly associated with both said armature and said yoke and vulcanized to said shaft.

2. In an electromagnetically operated telephone ringer, a stationary yoke, a rotatable armature and means for mounting said armature on said yoke comprising a shaft, and a rubber sleeve vulcanized to said shaft, said shaft being mechanically staked at one end to said armature for rotation therewith and said sleeve fixedly associated with both said armature and said yoke.

3. In an electromagnetically operated telephone ringer, a stationary yoke having a pair of split

integral projections extending at right angles to the main body portion thereof, a movable armature having a pair of split integral projections extending therefrom, the split projections of said yoke and armature being in alignment, and means for mounting said armature on said yoke comprising a rubber sleeved shaft, the sleeve of which is vulcanized to the shaft and clamped between the split portions of the armature and yoke projections.

4. In an electromagnetically operated telephone ringer, a stationary yoke, an armature rotatable relative to said yoke and a rubber sleeved rod interconnecting said yoke and said armature, the sleeve thereof being fixed against rotation relative to said yoke and said armature and vulcanized to said rod and said rod being rotatable with said rotatable armature.

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