Dec. 12, 1950 R. T. JENKINS 2,533,465

CLAPPER FOR TELEPHONE RINGERS

Filed Nov. 28, 1947

FIG. 1

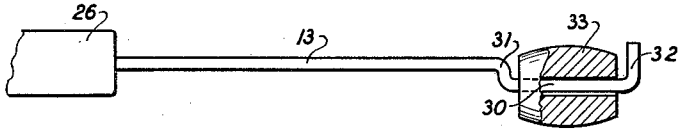
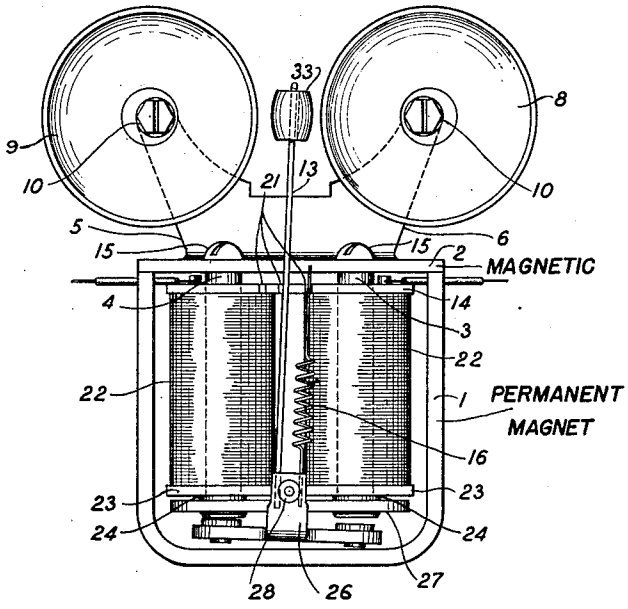


FIG. 2



INVENTOR
R. T. JENKINS

BY A. F. Kane

ATTORNEY

Patented Dec. 12, 1950

2,533,465

UNITED STATES PATENT OFFICE

2,533,465

CLAPPER FOR TELEPHONE RINGERS

Reginald T. Jenkins, Summit, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application November 28, 1947, Serial No. 788,344

4 Claims. (Cl. 177—7)

1

This invention relates to audible signaling devices involving clapper-actuated gongs and bells, and particularly to improvements in the clapper and clapper rod assembly employed in telephone ringers.

The audible signaling device in common use today at telephone subscribers' stations is generally known as the telephone ringer. This device comprises an electromagnetically-controlled, vibratable clapper rod which fixedly supports a clapper, or ball, between two spaced gongs so that as the rod is vibrated the clapper, or clapper ball, strikes the gongs alternately to produce a sound signal.

The objects of this invention are to improve the operating characteristics of telephone ringers; to render the sound producing elements thereof substantially impervious to wear; to insure uniform operation of the clapper; to insure substantially constant sound output of the ringer over a wide range of operating currents for any given armature travel and more stable operation of the ringer at small clapper rod amplitudes; and to preclude the necessity for frequent adjustments and replacements in the field.

These objects are attained in accordance with a feature of the invention by means of a novel clapper and clapper rod assembly which permits the clapper, or gong striking element of a telephone ringer, to experience substantially universal movement relative to its supporting clapper rod. More particularly, the free or unstaked end of the clapper rod is so configured as to provide a bearing, or seat upon which the clapper or clapper ball is mounted so as to be capable of longitudinal and rotational movements relative thereto.

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

Fig. 1 is a plan view of a clapper and clapper rod assembly embodying the features of this invention; and

Fig. 2 is a plan view of a well-known type of telephone ringer showing the clapper and clapper rod assembly of this invention incorporated therein.

The ringer structure disclosed, by way of example, in Fig. 2 comprises a U-shaped permanent magnet 1 having its two spaced ends joined by a cross bar 2 of magnetic material and secured thereto in any suitable manner, 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

2

secured gongs 8 and 9, respectively, by means of screws 10.

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

A plate 14 of relatively stiff insulating material, such as phenol fibre, serves as a common upper spoolhead for the coils 22 and is provided with suitable apertures through which the upper ends of the cores 3 and 4 protrude. Along the outer edge of plate 14 there is provided a series of notches 21 which accommodate the upper end of a biasing spring 16, the lower end of which is staked or otherwise secured to an armature 26. By shifting the spring end from notch to notch, the biasing force on the armature may be varied.

The coils 22 of the electromagnets are wound on the cores 3 and 4 between the plate 14 and circular spoolheads 23 located near 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. A yoke 27 formed of two integrally joined annular portions is force-fitted on the enlarged core ends 24. The yoke 27 at its center has two oppositely disposed upturned projections (not shown) which are in substantial alignment with the vertical projections of the armature 26. These yoke projections provide means for supporting the shaft 28 upon which the armature 26 is pivotally mounted.

A striker rod, or clapper rod 13 is staked to the forward vertical projection of armature 26 and extends therefrom so that its free end is located in the space between the two adjacent gongs 8 and 9. The outer, or free end of the rod 13, is offset to provide a longitudinal bearing 30 interposed between the substantially vertical projections 31 and 32 (viewing Fig. 1). A clapper or clapper ball 33, shown in section in Fig. 1, is floatingly supported on the rod portion 30. The ball 33 is provided with a central bore having a diameter considerably in excess of the diameter of the bearing 30 of rod 13. The over-all length of the clapper 33 is less than the length of the bearing 30. By virtue of the variations between the lengths and diameters of the bearing 30 and of the clapper bore the clapper 33 is free to move longitudinally and rotationally, respectively, relative to the rod 13 or the integrally formed bearing 30. The rod 13 may be preformed to provide the bearing portion 30 and after the ball 33 is

located thereon the outer projection 32 may be formed.

The advantages derived from the use of the clapper and clapper rod assembly of this invention are many of which the following are typical and perhaps the more important:

1. With the free clapper sufficient overthrow of the clapper is obtained for small armature amplitudes to actuate the gongs without the necessity of employing excessively small and therefore troublesome gong clearances, it being understood that, in correctly designed ringers, the gongs are struck on the overthrow of the clapper and not near the end of the armature stroke. Because of this increase in clapper overthrow practical values of gong spacings may be employed.

2. Less critical gong spacing is necessary particularly at small armature motions.

3. A more constant sound output, particularly at small armature movements, is obtained over a wide range of operating currents. In other words, with a clapper ball rigidly attached to the clapper rod the sound output of the ringer is more a function of the ringing current than it is with the loose clapper. This is especially true when the armature stroke is cut down to lower than normal amplitudes for the purpose of reducing the sound output of the ringer. It is desirable for the sound output to remain constant for any given length of armature stroke over the complete range of operating currents met under varying line loop and extension conditions in service. The loose clapper gives more constant sound output over wider current ranges for a given armature stroke and particularly for small amplitudes of armature stroke because the increased number of degrees of freedom of the loose clapper ball provide overthrow in addition to that formerly obtained by the flexure of the clapper rod alone. That is, the loose clapper ball can move beyond the point that a fixed clapper would reach due to flexure of the clapper rod.

4. There is less wear on the clapper ball at two diametrically opposite spots due to uniform wear on the whole circumference caused by the rotating motion of the clapper. Thus there is less change in gong spacing after wear.

5. There is less wear on both the clapper and the gongs due to a reduction in the sliding action of the clapper on the gong which occurs with a fixed clapper and rod assembly. A fixed clapper tends to slide on the gong on striking by virtue of flexure in the clapper rod causing abrasion of the clapper and gong. This soon wears flat spots on the surfaces and progressive wear occurs throughout the life of the ringer, increasing the overthrow gap and reducing sound output. Since the loose clapper is free to rotate and move laterally the amount of sliding is reduced so that there is less friction and hence less abrasion on the gongs and clapper with a consequent reduction in wear.

6. There is less scattering of any abrased particles of metal over parts of the ringer and therefore less liability of interference from this source with the operation of moving parts. Since there are less wear particles the probability of them getting into the armature air-gap and blocking armature motion is lessened.

7. There is less damping of the gongs due to the quicker rebound of the clapper during a cycle of operation of the ringer armature.

8. There is increased clapper travel at larger amplitudes of armature travel because of the sliding of the clapper out to the end of the rod due to centrifugal force. The clapper travels outwardly along the rod a distance proportional to the centrifugal force so that for large amplitudes of motion of the armature the curvature of the gongs permit increased clapper overthrow travel.

9. The wear on the inside of the clapper bearing compensates for gong wear thereby insuring sufficient clapper motion to actuate the gongs.

10. Transient impulses which might cause false signaling are more likely to be damped out because of the dissipation in the clapper bearing. Non-operate currents, such as transient currents from dial pulses tend to cause the armature to vibrate slightly without actually operating. Frequently, the amplitude at the end of the clapper rod is enough to make contact between the clapper and a gong causing a false ring. In the loose clapper assembly some of the energy is dissipated as friction on the clapper rod and there is a damping action tending to reduce the possibility of false ring. In addition, a free clapper and rod assembly constitutes a loosely coupled system and motion under conditions mentioned is not transferred to the clapper ball.

What is claimed is:

1. In combination, a signal gong, and an actuator therefor comprising a clapper rod having a bearing portion at one end thereof, and a clapper ball carried by the bearing portion of said rod, said clapper ball having a central bore of larger diameter than the diameter of the bearing portion of said rod and of shorter length than the length thereof whereby said clapper ball is capable of rotational and longitudinal movements relative to the bearing portion of said rod.

2. In combination, a signal gong, a striker for said gong comprising a rod, and a ball carried by said rod having a central bore of such diameter as to freely accommodate said rod whereby said ball is free to move in the direction of said gong independently of said rod after said rod has ceased to move in the direction of said gong, and means for moving said rod in the direction of said gong.

3. In combination, a signal gong, and an actuator therefor comprising an oscillatable clapper rod having spaced offset portions near one end thereof defining a bearing portion, and a clapper ball slidably mounted on the bearing portion of said rod.

4. A striker for a gong comprising a rod having a straight bearing portion at one end thereof, a clapper ball slidably and rotatably supported on the bearing portion of said rod, and means located at each end of the bearing portion of said rod for limiting the extent to which said ball may slide thereon.

REGINALD T. JENKINS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
473,854	Rockwell	Apr. 26, 1892
603,046	Peterson	Apr. 26, 1898
611,794	Ross	Oct. 4, 1898
620,138	Hunter et al.	Feb. 28, 1899
620,297	Freeman	Feb. 28, 1899