

May 2, 1939.

G. R. EATON

2,156,842

BELL

Filed Sept. 18, 1937

Fig. 1.

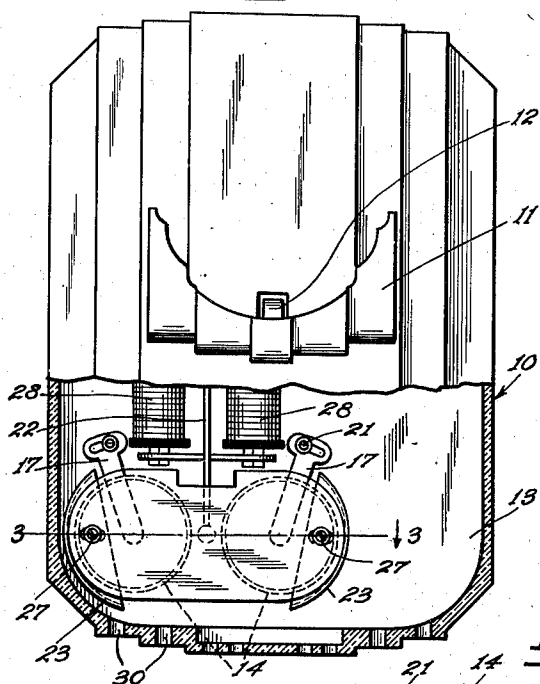


Fig. 4.

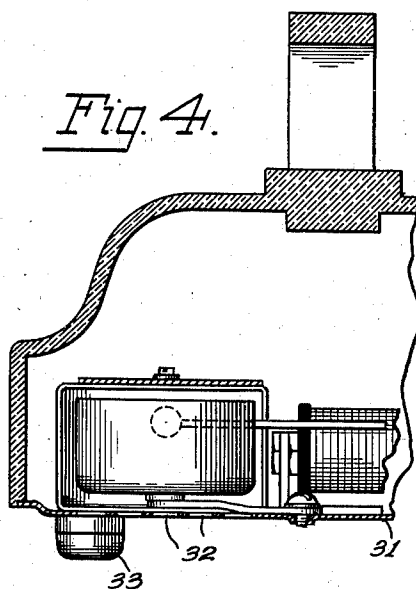


Fig. 2.

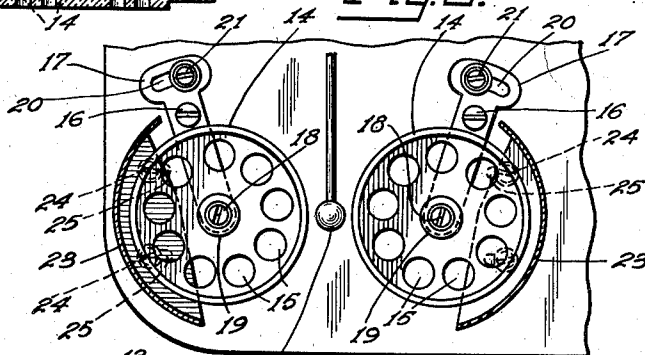
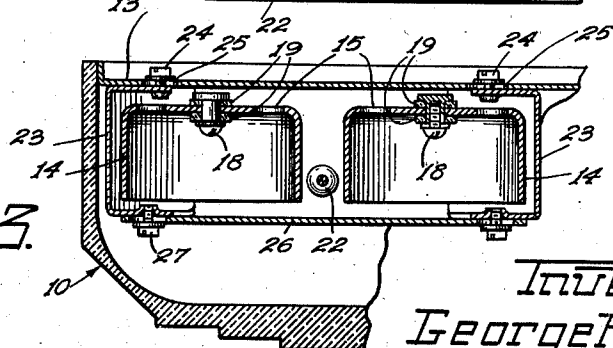


Fig. 3.



Inventor:

George R. Eaton

By C. R. Soper -
Att'y.

UNITED STATES PATENT OFFICE

2,156,842

BELL

George R. Eaton, Oak Park, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill., a corporation of Illinois

Application September 18, 1937, Serial No. 164,462

4 Claims. (Cl. 116—148)

This invention relates to a new and useful improvement in bells, and particularly to a resonator and reflector to be used with small bells or ringers in self-contained telephone sets.

Formerly it has been the practice to provide in connection with desk sets a telephone bell box within which has been positioned certain auxiliary apparatus and on which has been mounted the bells or ringers which are operating to signal the subscriber when an incoming call is received. The bells used with equipment of this type were usually of ample proportion and are well known to all who are skilled in the art.

More recently it has been customary to provide self-contained telephone sets having no auxiliary bell box, the apparatus which has formerly been mounted in the bell box, including the bell or ringer, being mounted in the base of the instrument. As it is desirable with devices of this kind to avoid excessive size of the base, the type of bell or signaling device formerly used in connection with a bell box has been found to be so large as to render its use practically impossible in connection with the self contained set. The present invention relates to a bell, or signaling device of decreased size, for use in a self-contained telephone set, either of the wall or desk variety.

With the self-contained sets it has been found that when the size of the bell or ringer is materially decreased and the bell is mounted within the telephone casing, the volume of sound produced is insufficient to give a satisfactory signal when a call is received. Applicant has found that by placing a reflector and resonator about the bell, the volume of sound produced by the bell is very materially increased so that a satisfactory volume of sound may be obtained from a bell of very small proportions.

It is believed that further disclosures of the invention will be most readily understood from a detailed description thereof, taken in connection with the accompanying drawing, in which:

Fig. 1 shows a wall telephone set with the casing broken away at one end thereof to disclose the bell or ringer therein;

Fig. 2 shows a portion of the device of Fig. 1 as viewed in the same direction but with the shield, which overlies the resonators, removed so as to give a clearer view of the device;

Fig. 3 is a section substantially on the line 3—3 of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is a sectional view of a portion of a

desk set telephone showing the manner of applying the present invention thereto.

The device shown in Fig. 1 is substantially that of Design Patent 104,109, filed April 13, 1937, and the device shown in Fig. 4 is that of Design Patent 104,087, filed March 30, 1936. It may be noted that the bell parts are shown in approximately actual size in Figs. 2, 3 and 4.

Referring now to the drawing, in which like reference characters indicate the same parts in the several views, 10 indicates the housing of a desk telephone which may be formed of Bakelite, or any other satisfactory material. Fixed to the face of the housing 10 is a receiver support 11 within the lower portion of which is the lever 12 corresponding to the usual hook switch. The opening in the housing on the side toward the wall is closed by means of a sheet metal cover member 13.

The separate sounding members, or gongs 14, of the bell, or ringer are of cup shape formation, as shown in Fig. 3, and the bottom, or closed portion thereof may be provided with a series of openings 15. Pivotaly supported on the cover, or base member 13, by means of screws 16 are the supporting arms 17. The closed, or bottom portion of the ringers 14 is secured to the free ends of the arms 17 by means of screws or rivets 18, washers 19 of resilient material being provided on opposite sides of the ringers 14 to permit movement and vibration thereof. Each of the arms 17 is provided at its opposite end with a slot 20 through which extends a screw 21 to permit ready adjustment of the gong members in relation to the clapper 22. Positioned on the remote sides of the gongs or bell members 14 are the resonators 23. These resonators are adjustably secured to the base or cover member 13 by means of the screws 24 which extend through slots 25 in the cover member 13, thus permitting the ready adjustment of the resonators in relation to the gongs. Positioned over the open sides of the gongs is a shield or deflector 26 secured to the top flanges of the shields 14 by means of the screw 27. At 28 are indicated the electromagnets of the bell, which operate the clapper 22 in the usual manner. Slots 30 are provided in the lower end of the housing 10 to facilitate the escape of the sound waves from the housing.

When a structure of the type above described was first tested without the resonators and deflector, the volume of sound provided was very unsatisfactory due, presumably, to the damping effect of the housing and apparatus therein.

Experiments show that the volume of the bell when enclosed in the housing was decreased by several dbs., so much so that it made it unsatisfactory. The resonators and deflector herein disclosed were developed to overcome this condition and it was found that the resonators increased the effective volume of sound by approximately 10 dbs., raising it to a volume greater than the ringer had when no casing or housing whatever was placed on the base. The fact that the volume, with the resonators and reflector on and with the housing or casing applied, is greater than that of the ringer on the base without the housing applied seems to indicate that the resonator and reflector has a function other than that of refracting the sound waves towards the openings in the base through which the sound passes.

Due to the manner of gong vibration, there are vibrations set up in four antinodes 90° apart. The stronger of these antinodes is located where the clapper strikes the gong and on the opposite side. The resonance chamber may be located opposite any two antinodes, although the best results are obtained when they are mounted on the side opposite the antinodes created directly by the clapper.

Experiments with this device seem to indicate that the resonators and reflector may perform either one or both of two functions; the first function is the elimination of out-of-phase waves tending to neutralize in-phase waves; the second function is to convert out-of-phase waves into in-phase waves and thereby materially increase the output.

The bell arrangement disclosed was considerably improved by the application of only the two resonators, but the shield appears to create additional directional action. In order to permit the maximum reflection of sound waves through the base, as for instance, in the desk set shown in Fig. 4, the gongs are perforated at their bottoms so as to permit sound waves to pass easily therethrough.

The structure disclosed in Fig. 4 is substantially identical with that disclosed in Figs. 1, 2 and 3, but is shown as applied in the base of a desk set. As thus applied, the base cover plate 31 is provided with a series of openings 32 through which the sound waves escape, the cover plate 31 being held in spaced relation to the table or desk surface by means of the legs 33, of resilient material.

During the experiments carried out in developing the present invention, it was discovered that the beneficial effects of the resonators and reflector are not dependent on any very exact form of the resonators or of any nice adjustment of them in relation to the gong, although, obviously, there are certain shapes and relations which give a maximum beneficial result.

In view of the fact that the structure herein disclosed may be departed from and still secure good results, it is to be understood that the invention is not restricted to the exact structure herein illustrated, but should be limited merely by the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a bell, a support, a generally cup-shaped gong, a tapper mounted for engagement therewith, means for actuating said tapper, dished resonators, one on each side of said gong, the concave sides of said resonators facing said gong and each other, said resonators extending from the support substantially parallel to the profile of and beyond the gong and inward to lap the periphery of the latter, and so enclosing the gong as to reflect back toward said gong substantially all sound waves received by said resonators which are not emitted by the resonators themselves in harmonized or concentrated sound, and means for mounting said gong and resonator on said support.

2. In a bell, a support, a generally cup-shaped gong, a tapper mounted for engagement therewith, means for actuating said tapper, arcuate resonators, one on each side of said gong, the concave sides of said resonators facing said gong and each other, said resonators extending from the support substantially parallel to the profile of the gong and beyond it and inward to lap the periphery of the gong, and so enclosing the gong as to reflect back toward said gong substantially all sound waves received by said resonators which are not emitted by the resonators themselves in harmonized or concentrated sound, a reflector overlying said gong and the space between said resonators, and means for mounting said gong and resonator on said support.

3. In a bell, a support, a pair of generally cup-shaped gongs, said gongs being spaced apart, a tapper mounted between said gongs for engagement therewith, means for actuating said tapper, dished resonators, one on each side of said pair of gongs, the concave sides of said resonators facing said gongs and each other, said resonators extending from the support substantially parallel to the profile of and beyond the gong and inward to lap the periphery of the latter, and so enclosing the gong as to reflect back toward said gong substantially all sound waves received by said resonators which are not emitted by the resonators themselves in harmonized or concentrated sound, and means for mounting said gong and resonator on said support.

4. In a bell, a gong, a tapper mounted for engagement therewith, means for actuating said tapper, dished resonators, one on each side of said gong, the concave sides of said resonators facing said gong and each other and so enclosing said gong as to reflect back to said gong substantially all sound waves received by said resonators which are not emitted by said resonators themselves in harmonized or concentrated sound, a housing perforated to transmit sound, means for supporting said gong within said housing, means for supporting said resonators and permitting adjustment thereof, toward and from the gong to govern reflection of the vibrations.

GEORGE R. EATON.