March 13, 1945. C. S. LINELL 2,371,453

TELEPHONE UNIT

Filed Jan. 26, 1942

Fig. 1

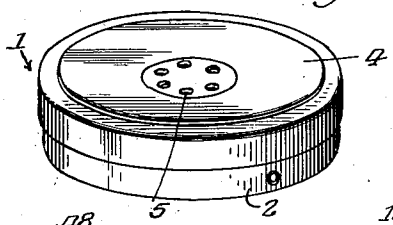


Fig. 2

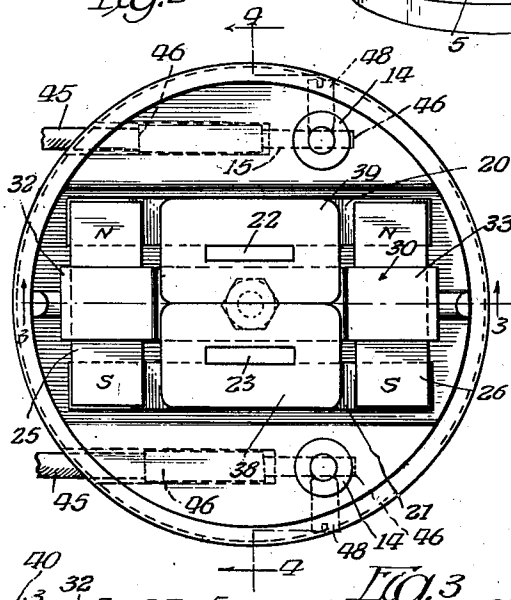


Fig. 5

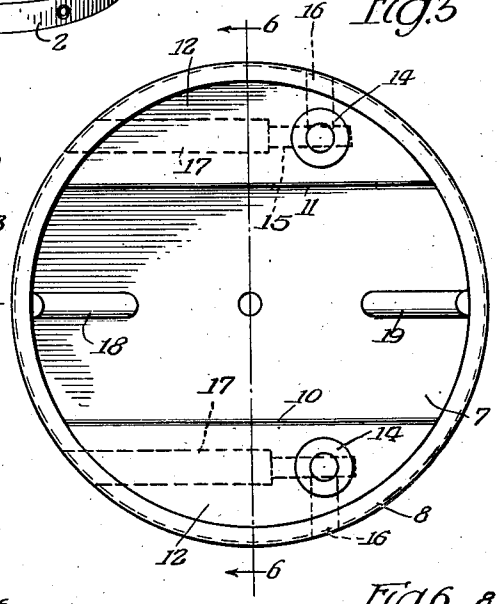


Fig. 3

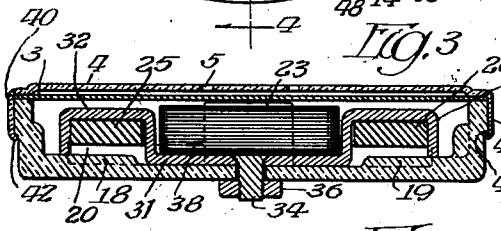


Fig. 6

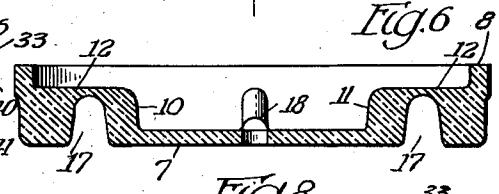


Fig. 4

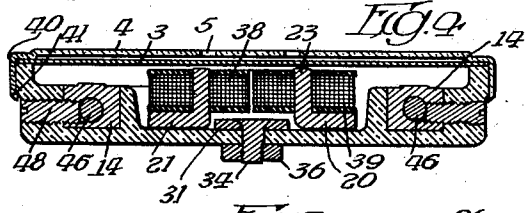


Fig. 8

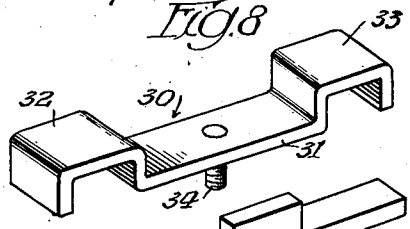


Fig. 7

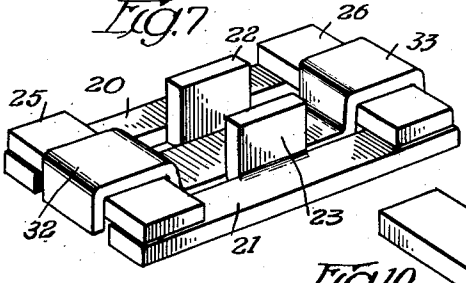


Fig. 9

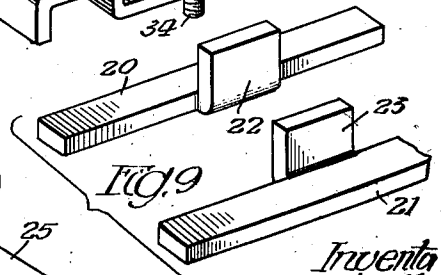
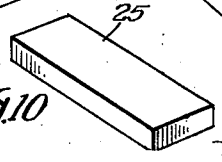


Fig. 10



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2,371,453

UNITED STATES PATENT OFFICE

2,371,453

TELEPHONE UNIT

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Application January 26, 1942, Serial No. 428,181

8 Claims. (Cl. 179—114)

This invention relates to telephone units, particularly telephone receivers. It is one of the objects of the present invention to provide a telephone receiver which can be made exceedingly thin and light in weight whereby the same is adapted to be mounted in a helmet such as is worn by aviators and the like. It is a further object of the present invention to provide a telephone unit which is rugged in construction and yet of great sensitivity in proportion to its weight.

It is a still further object of the present invention to provide a telephone unit which is simple in construction, efficient and reliable in its operation, light in weight and economical of manufacture.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a perspective view of a telephone unit embodying the principles of the present invention;

Figure 2 is a top view of the unit with the cover thereof removed;

Figure 3 is a transverse sectional view taken along the line 3—3 of Figure 2 and looking in the direction of the arrows;

Figure 4 is a sectional view taken along the line 4—4 of Figure 2 and looking in the direction of the arrows;

Figure 5 is a top view of the casing of Figure 2 with the electrical mechanism removed therefrom;

Figure 6 is a sectional view taken along the line 6—6 of Figure 5;

Figure 7 is a perspective view of the magnetic structure of the telephone unit;

Figure 8 is a perspective view of the clamp used for securing the magnetic structure in place;

Figure 9 is a perspective view of two iron bars constituting a part of the magnetic structure of the unit; and

Figure 10 is a perspective view of one of the bar magnets of Figure 7.

Reference may now be had more particularly to the drawing wherein like reference numerals designate like parts throughout.

The telephone unit of the present invention is indicated at 1 and is of a generally circular shape. It consists of a shallow open top circular casing 2 of molded insulating material within which the electrical parts are contained, a thin flexible telephone diaphragm 3 (Fig. 3), and a cover 4 overlying the diaphragm. The cover has a number of holes or perforations 5 through which sound may pass to or from the diaphragm as is usual in telephone receivers. The casing 2 is illustrated more fully in Figures 5 and 6 and consists of a base 7 having a peripheral rim 8. The bottom of the casing 2 is of reduced thickness to form two vertical walls 10 and 11 rising from the base 7 to form a shallow trough extending across the casing. These walls terminate in ledges 12—12. Terminal plugs 14—14 of brass or the like are molded in the casing at the time of manufacture thereof. Thereafter (or even during the molding) two holes at right angles to one another are formed from the rim 8 to each terminal plug. One of these holes, indicated at 15, is for receiving a line conductor which extends into a bore in the terminal. The other hole, indicated at 16, is for receiving a screw that threads into the terminal plug and presses against the tip of a conductor inserted thereinto through the hole 15, thereby establishing good electric conductivity between the bared end of the conductor and the terminal plug. The bottom outside surface of the casing has two conductor receiving grooves 17—17 in line with the holes 15—15. Spacers 18—19 are integral with and extend upwardly from the base 7 for a purpose which will be apparent as this description proceeds.

The magnetic structure for the telephone unit comprises two identical soft iron bars 20—21 of a construction such as shown more fully in Figure 9. Each of these bars is formed of a soft iron stamping of a generally T-shape, with the stem of the T bent upwardly, as indicated at 22—23, to constitute cores for receiving the usual telephone unit windings. These cores 22—23 are integral parts of the bars 20 and 21 respectively. The soft iron bars 20 and 21 are laid on the base 7 between the spacers 18 and 19 which thus assure the separation of the bars 20 and 21 from one another. Powerful permanent magnet bars 25—26 are then laid across the bars 20—21. The magnets overlie the spacers 18—19 and rest upon the bars 20—21. The magnets 25—26 are positioned over the bars 20—21 so that like poles are positioned over the same bar. As illustrated, the north poles of the two magnets are over and in contact with the bar 20 whereas the south poles of the two magnets are over the bar 21. Thus both magnets are connected in parallel, and in the embodiment here illustrated the core 22 is a north pole and the core 23 is a south pole. A non-magnetic clamp is then mounted to hold the magnetic structure in place. The clamp

consists of a strip of brass or other non-magnetic metal, having a bottom portion 31 which rests on the base 7 between and parallel to the soft iron bars 20—21. The bottom 31 is bent to form two inverted U-shaped hooked portions 32—33 which embrace the bar magnets 25—26. A screw 34 is inserted through a hole in the clamp 31 the head of the screw resting in a countersunk hole in said clamp. A nut 36 threads on the shank of the screw 34 on the outside of the casing. Upon tightening of the nut 36 the screw draws the clamp 30 firmly against the base 7 and thus firmly holds the magnetic structure in place.

A pair of wound metallic coils 38—39 having rectangular holes therein of a size corresponding to that of the cores 22—23 are then slipped over the cores, upon which they fit snugly. The two coils 38—39 are electrically connected in series. The lead wires of the two coils are connected respectively to the terminals 14—14 in any desired manner.

The thin metallic telephone diaphragm 3 rests upon the top of the peripheral rim 8 and is spaced slightly from the cores 22—23. The non-magnetic cover 4 is made very thin and is preferably of light metal such as, for instance, aluminum. The cover has a peripheral flange or rim 40 which closely embraces the rim 8. The rim 8 is provided with a small shoulder at 41 extending around the entire periphery of the unit. The edge of the flange or rim 40 is spun or pressed inwardly, as indicated at 42, to secure the cover in place. The cover bears against the telephone diaphragm 3 only along the rim 8 and is spaced from the diaphragm along the rest of the area of the diaphragm, as may be seen from Figures 3 and 4.

Line conductors for extending the circuit to the telephone unit are indicated at 45—46. These are insulated conductors having a bared tip. The tip 46 of each conductor is inserted through one of the holes 15 into a hole in the associated terminal 14 and is then secured in place by a screw 48 that extends through the hole 16 and threads into the terminal 14 and presses the bared tip of the conductor into firm engagement with the terminal. The metallic tip 46 which is secured to the end of each conductor 45 terminates in the groove 17 and is held in the groove 17 by the screw 48. The insulation on the conductor 45 at the point where the conductor is secured to the tip 46 also lies in the groove 17 and thus is not subject to bending action, thereby prolonging the life of the conductor.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention.

What I consider new and desire to secure by Letters Patent is:

1. In a telephone unit, a pair of spaced parallel soft iron bars, a pair of magnets overlying the bars at the ends thereof, means for holding the magnets in position on the bars, said means comprising a non-magnetic mounting spacer between the bars and substantially at the same level as that of the base of the bars and having upstanding hook portions at the ends thereof overlying the magnets and holding them in place, each of said bars having a coil-receiving magnetic core integral therewith and extending therefrom adjacent to and parallel to one another, and magnetizing coils surrounding said cores and overlying both the bars and the spacer.

2. A telephone unit comprising a shallow open top casing of non-magnetic material and having a peripheral rim, a pair of spaced parallel magnetic bars in said casing, a pair of spaced permanent magnets across the bars at opposite ends thereof, said bars having parallel coil receiving cores integral therewith and extending therefrom adjacent one another and between the magnets, a non-magnetic securing clamp extending across the magnets and between the cores and secured to the bottom of the casing, and telephone coils embracing the respective cores and overlying the securing clamp.

3. A magnetic structure for a telephone unit, said structure comprising two side by side parallel soft iron bars each having a winding-receiving core integral therewith and projecting therefrom midway between the ends thereof, and permanent magnets bridging the two bars at opposite ends thereof, said magnets being magnetically in parallel across the two bars, and a non-magnetic clamp between the bars at the level of the bars and bearing against the magnets for securing the magnetic structure in place.

4. A magnetic structure for a telephone unit, said structure comprising two side by side magnetic bars each having a winding receiving core integral therewith and projecting therefrom midway between the ends thereof, permanent magnets bridging the two bars at opposite ends thereof, each core being at right angles to and between both magnets, a non-magnetic clamp embracing both magnets and extending from one magnet to the other between the bars and at the level of the bars, and coils on the cores with the bottoms of the coils substantially on the bars.

5. A magnetic structure for a telephone, said structure comprising two side by side bars of magnetic material having winding-receiving cores integral therewith and extending upwardly therefrom intermediate the ends thereof, a permanent magnet overlying adjacent ends of the bars, a second permanent magnet overlying the ends of the bars opposite the first mentioned ends, a non-magnetic clamp between the two bars, said clamp comprising a metal strip the ends of which are bent to form inverted U-shaped brackets embracing the respective magnets and clamping them towards the bars and means at the center of the bracket for securing the bracket in place.

6. A telephone unit comprising an open top casing of a generally circular shape and having a trough across the same at the bottom thereof, a magnetic structure in said trough, said structure comprising two side by side bars of magnetic material having winding-receiving cores integral therewith and extending upwardly therefrom intermediate the ends thereof, a permanent magnet overlying adjacent ends of the bars, a second permanent magnet overlying the ends of the bars opposite the first mentioned ends, a non-magnetic clamp between the two bars, said clamp comprising a metal strip the ends of which are bent to form inverted U-shaped brackets embracing the respective magnets and clamping them towards the bars, means at the center of the bracket for securing the bracket in place in the casing, magnetic windings on the cores, terminals embedded in the casing on opposite sides of and spaced from the trough and making a liquid-tight sealing fit in the casing, said windings

being connected to the terminals, and line wire receiving holes formed in the casing and extending to the terminals.

7. A telephone unit having a shallow open casing of non-magnetic material and having a peripheral rim, a rectangular trough in the base of the casing on the inside thereof, a rectangular magnetic structure within and substantially filling said trough and comprising two side by side parallel soft iron bars each having a winding-receiving core integral therewith and projecting therefrom between the ends thereof, permanent magnets bridging the two bars at the opposite ends thereof, a non-magnetic clamp on the base of the trough between the bars and extending across the magnets for holding the magnets in place on the bars, and means securing the clamp to the base of the trough of the casing.

8. A telephone unit having a shallow open casing of non-magnetic material and having a peripheral rim, a rectangular trough in the base of the casing on the inside thereof, the portions of the bottom of the casing between the trough and the rim forming ledges on opposite sides of the trough, a rectangular magnetic structure within said trough and comprising two side by side parallel soft iron bars each having a winding-receiving core integral therewith and projecting therefrom between the ends thereof, permanent magnets bridging the two bars at the opposite ends thereof, a non-magnetic clamp on the base of the trough between the bars and extending across the magnets for holding the magnets in place on the bars, means securing the clamp to the base of the trough of the casing, coils on the cores, and terminals embedded in the ledges and sealed therein, said ledges having line wire receiving holes extending therein from the terminals to the outside of the casing.

CHARLES S. LINELL.