To all whom it may concern:

Be it known that I, Louis Weber, a citizen of the German Empire, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in Auricular Telephone, of which the following is a specification.

Applications for patent on this subject matter have been filed by me in the following foreign countries: Germany, July 24th, 1919, Ser. No. 50,646; Holland, July 16th, 1920, Ser. No. 15,640; Sweden, July 6th, 1920, Ser. No. 3,926/30; Italy, July 23rd, 1920, Ser. 293/25; Switzerland, July 5th, 1920, Patent No. 92,011; England, July 26th, 1920, Patent No. 149,621; Poland, July 24th, 1920, Ser. No. 11,944; Spain, February 19th, 1921, patent granted June 7th, 1921, No. 77,136; France, March 1st, 1921, patent granted October 25th, 1921, No. 531,513; Austria, July 8th, 1920, Ser. No. 3,729/20; Czecho-Slovakia, July 22nd, 1920, Ser. No. P. 6094/20; Jugo-Slovakia, March 29th, 1921, Ser. No. 433/21; Belgium, March 3rd, 1921, Ser. No. 235,505; and Hungary, March 14th, 1921, Ser. No. 4,325.

My invention refers to telephone receivers, and more especially to telephone receivers which can be inserted in the auditory duct.

It has been suggested to make telephones, especially such for people who are hard of hearing, in the shape of a cartridge to be inserted in the auditory duct. In realizing this suggestion in practice it was found that these telephones could not be manufactured small enough to allow of their being accommodated entirely within the auditory duct, a considerable portion of the apparatus projecting from the auditory duct, so that it was necessary to fix this projecting portion in position by means of fastening devices, such as, for instance, hooks to be laid around the auricle, in order to prevent the whole telephone apparatus from slipping out of the auditory duct. Moreover it has been proposed to design auricular telephones of so small a size that they could be accommodated approximately in the central part of the auricle, whilst projecting into the auditory duct with an elongation. In this case the fastening is intended to be achieved by the part to be inserted in the auditory duct being provided with a ball of cotton or the like, wound around the elongation and fitting as tightly as possible into the auditory duct. This method of fastening is, however, uncomfortable and unhygienic and moreover exerts a pernicious pressure on the auditory duct.

According to my invention, the above disadvantages are avoided by giving the telephone a substantially L-shaped contour, the arm intended for the auditory duct containing the telephone diaphragm as well as the magnet coils, whilst the magnet is arranged in the other arm. The distribution of weight is suitably arranged in such a manner that the centre of gravity of the whole telephone is located in the part to be inserted in the auditory duct.

In the drawings affixed to this specification and forming part thereof a device embodying my invention is illustrated by way of example. In the drawings—

Fig. 1 is a section of an ear and auditory duct showing the manner in which the telephone is fastened in the ear.

Fig. 2 is a back view of the apparatus with the closing cap removed.

Fig. 3 is a cross-section of the apparatus.

Fig. 4 is a front view of the apparatus with the ear piece and diaphragm removed.

Fig. 5 is a modification of a detail.

Fig. 6 is a longitudinal section through the middle portion of the telephone in larger scale.

Fig. 1 of the drawings illustrate the manner in which the telephone is fixed in the ear. The horizontal part which is provided with an oval or olive shaped ear piece, is inserted in the auditory duct proper; the vertical part to which the connections are attached, fits into the incisura intertragica and lies up against the lobe of the ear. In consequence of the telephone being adapted to the anatomical structure of the ear, the apparatus clings to the ear without further holding means and with such firmness that the possibility of the apparatus dropping out is remote even if a certain amount of tension is exerted on the attached conducting wires.

Figs. 2 to 4 of the drawings illustrate the construction of the telephone on an enlarged scale.

The telephone is contained in a casing of non-magnetic material, such as brass. This casing consists of a cylindrical chamber 1,
followed by an oblong prismatic chamber 2 of rectangular cross-section. A U-shaped magnet 3 is provided in the prismatic chamber, whilst the pole shoes 4 bearing the magnet coils 5 are contained in the cylindrical chamber. Extensions 7 of the pole shoes project through slots in the back wall or partition 6 of the chamber 1 and into the back chamber where they touch against the sides of the upper ends of the U-shaped magnet 3. Screws 8 which rigidly press the casing, the extensions 7 and the magnet against one another and keep these parts in their relative positions, are screwed through the casing from the outside. Underneath the magnet 3 a small block 9 of insulating material is arranged in the chamber 2, the said block being provided with small screws 10 for connecting the interior wiring with the exterior wiring 11. The wiring 11 is taken through a slotted bushing 12 which is compressed by means of a cap nut 13 in such a manner as to keep the wiring 11 rigidly in position. The inner wiring extends from the chamber 2, the open back of which is closed by means of a cover 15 fastened by screws and reaches the cylindrical front part 1 through a boring 14.

As will be noted more particularly from Fig. 6, a small iron disc 16 serving as the armature is arranged opposite the pole shoes 4, this disc being fastened to a diaphragm of gold-heaters skin 17 or other membranous material suitable for this purpose. The diaphragm is tautened by means of a cylindrical plug 18 inserted in a socket-like element 19 which is threaded onto chamber 1. This socket is followed by an ear piece 20 of ebonite or some other suitable material, which is inserted in the auditory duct. In order to fix socket 19 bearing the diaphragm in various positions relatively to the chamber 1, a lock-nut 21 is screwed against the end of socket 19. The releasing and readjusting of the screw arrangement offers a very handy means for adjusting the distance between the diaphragm and the pole shoes so as to provide the degree of sensitivity required for the individual cases. In order to protect the diaphragm against being damaged by pressing it against the pole shoes in the course of such an adjustment, an abutment 22 is provided which prevents the lock-nut 21 from being screwed back too far. By this adjustability of the telephone it becomes possible to adjust the apparatus to suit the degree of sensitivity of the ear when the instrument is used by persons suffering from hardness of hearing.

The olive shaped ear piece 20 is attached to the diaphragm carrier 18 by means of a screw stud 23 so that it can easily be exchanged. By this means a wide adaptation to the varying anatomic conditions of differently shaped ears is ensured; an ear piece shaped to suit the ear according to whether the auditory duct possesses a larger or smaller diameter may thus be screwed on to the apparatus.

A modification of the device for adjusting the diaphragm distance, which differs slightly from the device described above, is illustrated in Fig. 3. In this case the socket containing the diaphragm is provided with a rim 24 fitted with milled grooves or steep indentures. A spring 25 soldered to the cover 15 of the casing, engages with one of them. The socket 19 is maintained in any position to which it is adjusted, by this pawl and notch locking device. This device renders the readjusting of the diaphragm still easier than in the case of the arrangement illustrated in Fig. 3. An abutment 22 in this case also prevents the diaphragm from being damaged.

I claim:

1. In a telephone receiver, the combination of an L-shaped casing, one arm of said casing being adapted to be inserted in the auditory duct, a telephone diaphragm and excitation coils both arranged in said arm and a permanent magnet arranged in the other arm.

2. In a telephone receiver, the combination of an L-shaped casing of non-magnetic material, one arm of said casing having substantially circular, the other arm having rectangular cross section, a telephone diaphragm, excitation coils and pole-shoes arranged within said arm of circular cross section and a U-shaped permanent magnet in said arm of rectangular cross section.

3. In a telephone receiver, the combination of an L-shaped casing of non-magnetic material, one arm of said casing having substantially circular, the other arm having rectangular cross section, a slotted partition subdividing the said casing in two chambers, each one arranged in one of said arms, a telephone diaphragm, excitation coils and pole-shoes disposed within the chamber in said arm of circular cross section, a U-shaped permanent magnet arranged in the chamber in said arm of rectangular cross section, said pole-shoes bearing said excitation coils and extending through said slotted partition, and means connecting the rear ends of said pole-shoes and the ends of said magnet to the walls of said casing.

4. In a telephone receiver, the combination of an L-shaped casing of non-magnetic material, one arm of said casing having substantially circular cross section, an oval end piece detachably secured to said cylindrical arm and adapted to be inserted in the auditory duct, a telephone diaphragm and excitation coils both arranged in said arm of cylindrical cross section, and a permanent magnet arranged in the other arm of said casing.

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5. In a telephone receiver, the combination of an L-shaped casing, one arm of said casing being adapted to be inserted in the auditory duct, a telephone diaphragm and excitation coils both arranged in said arm, and a permanent magnet arranged in the other arm of said casing, the weight being distributed in such a manner that the center of gravity lies in the arm to be inserted in the auditory duct.

6. In a telephone receiver, the combination of an L-shaped casing, one arm of said casing being adapted to be inserted in the auditory duct, a telephone diaphragm of membranous material arranged in said arm, an iron armature secured to said diaphragm, excitation coils and pole-shoes in said arm adjacent to said armature, and a permanent magnet, attached to said pole-shoes, in the other arm.

7. In a telephone receiver, the combination of an L-shaped casing of non-magnetic material, one arm of said casing being adapted to be inserted in the auditory duct, pole-shoes and excitation coils arranged in said arm, a telephone diaphragm in said arm adjustably arranged relatively to said pole-shoes and a U-shaped magnet arranged in the other arm of said casing and connected with said pole-shoes.

8. In a telephone receiver, the combination of an L-shaped casing of non-magnetic material, one arm of said casing being adapted to be inserted in the auditory duct, pole-shoes and excitation coils arranged in said arm, a telephone diaphragm in said arm adjustably arranged relatively to said pole-shoes, an abutment preventing the moving of said diaphragm against said pole-shoes below a predetermined limit, and an U-shaped magnet arranged in the other arm of said casing and connected with said pole-shoes.

9. In a telephone receiver, the combination of an L-shaped casing, one of its arms having cylindrical form and being adapted to be inserted in the auditory duct, the other arm having rectangular form, pole-shoes and excitation coils thereon disposed in said cylindrical arm and a U-shaped magnet in said rectangular arm connected to said pole-shoes, said cylindrical arm having a socket threaded to it, a diaphragm fastened in said socket and adjustable relatively to said pole-shoes by the turning of said threaded socket, means for limiting the extent of said adjustment and an ear piece removably attached to said socket and operatively connected with said diaphragm.

10. In a telephone receiver, the combination of an L-shaped casing, one of its arms having cylindrical form and being adapted to be inserted in the auditory duct, the other arm having rectangular form, pole-shoes and excitation coils thereon disposed in said cylindrical arm and a U-shaped magnet in said rectangular arm connected to said pole-shoes, said cylindrical arm having a socket threaded to it, a diaphragm fastened in said socket and adjustable relatively to said pole-shoes by the turning of said threaded socket, means for limiting the extent of said adjustment and an ear piece removably attached to said socket and operatively connected with said diaphragm the center of gravity of the entire casing being located in its cylindrical arm.

In testimony whereof I affix my signature.

LOUIS WEBER.