



Phone and Volume Control Unit

The present invention pertains to a phone, particularly an ear phone, as well as to a volume control unit for a phone.

Phones and ear phones are sufficiently known in many different variations. However, such head phones are frequently perceived as being excessively heavy and frequently do not provide the required wearing comfort, particularly during physical activities.

There also exist so-called in-ear phones that can be inserted into the outer ear and are then more or less firmly seated on the outer ear. Such in-ear phones are perceived as being uncomfortable by some persons, for example, because they can lead to pressure points in the outer ear or because they can fall out of the ears of some persons.

EP 1 250 025 A1 describes a neck band ear phone, the neck band of which is at least partially coiled up when it is not worn. In the worn state, the neck band presses against the back of the head of the person wearing the ear phone. The neck band extends from the transducer housing over the upper ear root and rests against the back of the head in the worn state. However, such a design of a neck band ear phone is not suitable, in particular, for persons who wear spectacles.

The present invention therefore is based on the objective of providing a phone that can be comfortably and safely worn.

This objective is attained with a phone according to Claim 1.

The invention therefore proposes a phone, particularly an ear phone, that features two transducer housings and a flexible head strap. The head strap is pre-shaped in such a way that it is coiled up and has at least one turn in its relaxed



and unworn state. The phone therefore can be stowed in a space-saving fashion when it is not worn.

According to one aspect of the present invention, the head strap features two first sections that are respectively connected to the transducer housing and a second
5 section that connects the two first sections. In the worn state of the phone, the two first sections essentially extend upward and parallel to the lateral head sections of the wearer. In the transition areas between the first sections and the second section, the head strap features a bend toward the back of the head. The second section is in the worn state essentially adapted to the transition between
10 the head and the back of the head and also features a bend that essentially adapts itself to the head of the wearer.

The invention also pertains to an ear adapter ring for an ear phone. The ear adapter ring is fixed on the transducer housing of a phone. The adapter ring essentially features a first round recess that is arranged in the center of the ring.
15 In addition, the ear adapter ring features recesses or grooves that in part extend radially from the outer edge toward the first recess.

The invention furthermore pertains to a volume control unit for a phone. The control unit features an outer tube unit with at least one opening and an inner tube unit with a first and a second end, as well as a longitudinal slot. The control
20 unit furthermore features a potentiometer unit with a projection on its upper side, as well as a counterpart with at least one projection. The projection of the counterpart is realized in such a way that it can engage into the opening in the outer tube. The outer tube unit is pushed over the inner tube unit and the projection is inserted into the opening of the outer tube unit in such a way that it engages into
25 the longitudinal slot and cooperates with the projection of the potentiometer unit, namely such that the adjustment of the potentiometer unit is varied during a relative displacement between the outer tube unit and the inner tube unit.

Other embodiments of the invention form the objects of the dependent claims.

Embodiments and advantages of the invention are described in greater detail
30 below with reference to the figures.

- Figure 1 shows a perspective representation of the components of a volume controller according to a first embodiment;
- Figure 2 shows an image of a phone with a volume controller according to a second embodiment;
- 5 Figure 3 shows an image of a phone with a volume controller according to a third embodiment;
- Figure 4 shows an image of an in-ear phone according to a fourth embodiment;
- Figures 5
- 10 to 5k show images of a phone according to a fifth embodiment;
- Figure 5l
- to 5n show images of an ear adapter ring according to Figure 5b;
- Figure 6 shows several images of an in-ear phone according to a sixth embodiment;
- 15 Figure 7a shows a schematic sectional representation of a section of a storage unit for phones;
- Figure 7b shows a top view of a storage unit for phones;
- Figure 8a shows a schematic representation of a storage pocket, in particular, for ear phones;
- 20 Figure 8b shows a top view of a second side of a storage pocket;
- Figure 8c shows another image of the storage pocket according to Figure 8a;
- Figure 8d shows another image of the storage pocket according to Figure 8a;
- Figure 8e shows another image of the storage pocket according to Figure 8a;

Figure 9a shows an image of another storage pocket;

Figure 9b shows another image of the storage pocket according to Figure 9a, and

Figure 10 shows an image of a phone according to another embodiment.

5 Figure 1 shows a perspective representation of the components of a volume controller for a phone according to a first embodiment. The volume controller is preferably arranged in or on a feeder cable of the phone. The volume controller features an outer tube 1 with at least two openings 1a, as well as an inner tube 2 with a first and a second end 2a and an upper center piece 2b. The upper center
10 piece 2b features a longitudinal slot 2c. A potentiometer unit 6 features a projection 6a on its upper side and connectors for a cable 5 on its first and its second end 6b. One end 5a of the cable 5 features a connector that can be connected to one of the ends 6b of the potentiometer 6. The projection 6a of the potentiometer is inserted into the longitudinal slot 2a, the ends 5a of the cable and of the poten-
15 tiometer are connected to one another, and a lower center piece 3 is used for pressing the potentiometer unit against the upper center piece 2b. The projection 6a preferably engages into the longitudinal slot 2c. Subsequently, the outer tube 1 is pushed over the inner tube 2, and a counterpart 4 with two projections 4a is fixed on the outer tube 1 in such a way that the two projections 4a protrude
20 through the openings 1a of the outer tube and through the longitudinal slot 2c and the projection 6a is held between the two projections 4a.

A relative movement between the outer tube and the inner tube causes the pro-
jections 4a and the projection 6a to be moved within the longitudinal slot 2c such
that the potentiometer unit is adjusted accordingly and the volume of a phone is
25 influenced.

Due to the design of the volume controller and, in particular, due to the fact that the outer tube 1 is pushed over the inner tube 2, the electrical and mechanical components of the potentiometer are reliably enclosed. In the volume controller according to Figure 1, the actuator of the potentiometer is arranged within the
30 outer tube 1. The actuator and the potentiometer preferably are respectively

arranged between the upper center piece 2b and the lower center piece 3. This ensures an efficient protection of the mechanical and electrical components.

Although the slot 2c was described above in the form of a longitudinal slot, this slot may also be realized in the form of a transverse slot such that the projections
5 4a and 6a are guided in such a transverse slot by turning the outer tube in order to set or adjust the potentiometer accordingly. In such instances, the potentiometer unit 6 needs to be realized in the form of a rotary potentiometer unit rather than a sliding potentiometer.

Figure 2 shows an image of an in-ear phone with a volume controller according
10 to a second embodiment. This figure shows, in particular, a lanyard 20 that accommodates the left and the right transducer 26, 25. The lower area of the lanyard is provided with a volume controller 21, in which the volume can be adjusted accordingly by actuating a wheel 22. A ferriferous and/or nickeliferous plate or a magnet is preferably arranged on the front side 25 of the volume controller 21 in
15 such a way that the rear sides of the transducer housings 26, 25 are held on the front side 23 due to magnetic attraction. To this end, the rear sides of the transducers 26, 25 either feature a ferriferous and/or nickeliferous plate or a magnet.

When the transducers are not needed, they can be held on the volume controller with their rear side by means of magnetic attraction. Alternatively, the transducers
20 can also be fixed on one another back-to-back.

The rear side of the volume controller 21 may be provided with a clip 21a that makes it possible, for example, to fix the volume controller on the clothes of the user.

Figure 3 shows an image of an in-ear phone with a volume controller according
25 to a third embodiment. The volume controller 21 according to the third embodiment corresponds to the volume controller according to the second embodiment. The transducers 26 and 25 according to the third embodiment correspond to the transducers 26, 25 according to the second embodiment. However, the second embodiment concerns a lanyard while the third embodiment concerns a conventional in-ear phone.
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The rear side of the volume controller 21 may feature a clip 21a that makes it possible, for example, to fix the volume controller on the clothes of a wearer.

Figure 4 shows an image of an in-ear phone according to a fourth embodiment. The in-ear phone features a transducer housing 32, as well as a transducer 33, and is connected to a feeder cable 31. On its inner side, the housing 32 of the in-ear phone features a hook-shaped recess 34, 35 at the transition between a lower part of the housing 32a and the upper housing 32b. The inner side 32c of the housing is essentially realized straight in the lower region 32a, wherein the housing is then tapered (section 34) and ultimately widened (section 35) in order to accommodate the transducer 33.

A thusly designed in-ear phone makes it possible to respectively realize a reliable seat of the in-ear phone in or on the outer ear such that an in-ear phone of this type is also suitable for use during a physical activity. Due to the hook-shaped recess in the housing of the in-ear phone, the in-ear phone is able to better adapt to the ear and the sound of the in-ear phone can be better coupled into the inner ear.

The illustration of the in-ear phone according to the fourth embodiment in Figure 4 essentially represents a 1-to-1 illustration of the phone and an exact image of the phone.

Figures 5a to 5c respectively show a perspective representation of a head phone according to a fifth embodiment. The head phone features a first and a second transducer 41, 42 that are connected to one another by an elastic (twisted) and prestressed strap (of essentially circular diameter) that is preferably realized in the form of a spring wire. The transducers 41, 42 are preferably realized in the form of in-ear phones. One of the transducers 41 is connected to an audio connector 46 by means of a cable 44. A clamp 45 may be provided along the cable 44 in order to fix the cable while the head phone is in use.

Figure 5b shows another image of the head phone according to Figure 5a. A flexible ring 41a or 41b that corresponds to the actual size of the outer ear -- and can be exchanged by the user -- can be placed over the transducer or the trans-

ducer housing 41. A cable 43a may be provided within the head band 43 in order to realize an electric feed from the cable 44 to the other phone.

Figure 5c shows another image of the head phone according to Figure 5a. The head band 43 or the head strap is respectively prestressed or preshaped in such a way that it is coiled up by 1 to about $1\frac{3}{4}$ turns in a relaxed state, i.e., up to about 630 degrees (coil angle), wherein the strap then has a diameter of about 80-100 mm, preferably 90 mm. In order to wear the head phone, the head strap needs to be bent apart such that a certain prestress is generated that presses the in-ear phones 41, 42 against the respective outer ear in order to ensure that it is reliably held thereon.

Figure 5d shows a top view of the head phone according to the fifth embodiment. In this case, the head phone is shown in an unworn state such that the phone is coiled up into a loop due to the preshaping of the head band or the head strap 43. In this case, the loop has a coil angle between 360 and 720 degrees, preferably between 550 and 630 degrees. Figure 5d shows a state, in which the head phone is automatically coiled up to a coil angle of about 560 degrees due to the shaping of the spring wire.

Figure 5e shows the head phone according to the fifth embodiment in the worn state. In this case, the housing 42 of an in-ear phone penetrates into the outer ear of a wearer. The head band 43 extends upward in the direction of the vertex of the head from the housing 42. In this case, the head strap 43 is essentially divided into a first section 43c and a second section 43d. In the worn state, the housing 42 of the in-ear phone extends upward and the first section 43c of the head band is connected to the housing 42. The first section 43c is bent rearward (toward the back of the head). The second section 43d is also realized in a bent fashion and approximately extends on a circular path (section) referred to the center of the head. However, the first section 43c essentially extends parallel to the lateral section of the skull while the second section 43d extends on the upper side of the skull or at the transition between the upper side of the skull and the back of the head. The point at which the second section 43d actually contacts the head of a wearer depends on the size of the head. If the wearer has a large

head, the second section 43d will be situated on the upper side of the skull.
However, if the wearer has a small head, the second section 43d will be situated
at the transition between the upper part of the skull and the back of the head,
wherein the curvature of the section 43d is greater on a smaller head than on a
5 larger head.

Figure 5f shows a detailed image of a first section of the head phone according to
the fifth embodiment. The housing 42 of the head phone is inserted into the outer
ear O. The feeder cable 44 is fixed on the housing 42 in such a way that it hangs
down from the outer ear O while the phone is worn.

10 Figure 5g shows another image of the phone according to the fifth embodiment in
a worn state. A housing 42 of the in-ear phone is arranged in the outer ear O.
The first section 43c of the head band 43 initially extends essentially parallel to
the lateral skull section and features a bend toward the rear part of the skull. The
second section 43d also features a bend and lies on the transition between the
15 back of the head and the upper side of the skull in this case. A prestress is ex-
erted upon the phones due to this bend.

Figure 5h shows a perspective side view of a phone according to a fifth embodi-
ment. The first section 43c of the strap is essentially connected straight to the
housing 240 of the in-ear phone. In Figure 5h, the in-ear phone according to the
20 fifth embodiment is illustrated in an unworn state, i.e., the strap 43 is coiled up
accordingly.

Figure 5i shows a schematic top view of the in-ear phone according to the fifth
embodiment. In this case, the phone is also illustrated in an unworn state, i.e.,
the strap 43 is coiled up accordingly due to its prestress.

25 Figure 5j shows another schematic image of the phone according to the fifth
embodiment. In Figure 5j, the phone is illustrated in an unworn state, i.e., in a
coiled-up state, wherein the phone is placed on a smooth surface. This figure
shows, in particular, that the housings 41, 52 of the in-ear phones are angled
relative to the surface by an angle α . This angle α lies between about 35° and
30 55°, preferably at about 40°. Bending points 43e are respectively provided in the

region of the transition from the first section to the second section 43c, 43e of the strap 43.

Figure 5k shows another perspective image of the phone according to the fifth embodiment. The phone is also illustrated in a coiled-up state in this case. A
5 bending point 43e is also provided at the respective transitions between the first and the second section 43c, 43d of the strap.

The strap 43 is preferably made of spring steel and features two bending points at the transitions between the first section and the second section 43c, 43d. It is possible to either utilize the spring steel for transmitting the audio signals from
10 one housing to the other housing or, alternatively, to provide another cable in the strap 43 for this purpose. The spring steel has a spring constant of about 800-1300 N/mm, preferably about 1100 N/mm. Due to the design of the phone, a contact pressure of less than 1 N is achieved.

Alternatively, it would also be possible to utilize a plastic for the implementation of
15 the strap 43 instead of spring steel. In such instances, however, it is necessary to provide an additional line for transmitting the audio signals from one in-ear phone to the other in-ear phone.

The strap 43 of the phone according to the fifth embodiment is not only flexible, but also prestressed or preshaped in such a way that it has a diameter of about
20 80 to 100 mm, preferably 90 mm, in an unworn state. In order to wear the strap, the strap needs to be tensioned, namely by initially turning the phone by about 180° (referred to the longitudinal axis of the head strap) and then pulling the two phones outward. In the tensioned state, the phone has the shape illustrated in Figures 5e, 5f and 5g. Due to this rotation or torsion, the phones have the ten-
25 dency to turn inward. The angle α (about 35-55°, preferably about 40°) according to Figure 5j enables the phones to adapt to the outer ear accordingly when the head phones are worn. Due to this torsion, the phones are subjected to a force that causes the phones to adapt to the outer ear. The torsion is preferably ad-
30 justed in such a way that the front side of the transducers presses slightly out-ward in the worn state and the phone consequently turns in the direction of the

ear canal. The phone therefore slightly turns against the protrusion of the outer ear such that the phone respectively locks in the outer ear or the ear canal and slightly turns toward the ear canal. This means that a torque of sorts is generated on the outer ear. The transducer housing therefore seals the outer ear in a superior fashion. In the transition area between the first and the second section 43c, 43d of the strap, angles 43e are preferably arranged in the spring steel. This angle is either pressed in or punched in. The two angles arranged in the transition areas not only cause the phone to be tightly fitted on the head, but the spring steel furthermore is only stabilized in the direction that corresponds to its design in the worn state. The selection of the angles 43e defines which side should represent the right side and which side should represent the left side.

The above-described torsion has a predominant direction such that the phone or the strap is only transformed into the intended shape for being worn by turning one phone in one direction. Consequently, a predominant unfolding direction is realized.

Although the head phone is illustrated with in-ear phones in Figures 5a to 5k, the head phone according to the fifth embodiment may also be realized with other phones.

Figure 5l shows an image of an in-ear phone that is arranged in an outer ear O.

Figure 5m shows another image of an in-ear phone in an outer ear. In Figure 5i, the in-ear phone features an ear adapter ring 41b.

The ear adapter rings 41a, 41b shown in Figure 5b are realized in a removable fashion such that an acoustic seal between a phone and the ear canal can also be ensured for different ear sizes with these sealing rings.

Figure 5n shows a top view of an ear adapter ring according to Figure 5m. This adapter ring respectively has a concavely curved cross section or is realized in a fungiform fashion, wherein a circular recess or hole 41b is provided in the center such that the ear adapter piece can be attached to a phone, particularly an in-ear phone. The outer region or the outer edge of the ear adapter piece 41bd may

contain recesses 41ba that in part extend axially toward the inner edge. It should be noted, however, that these recesses do not extend completely up to the hole 44bb.

5 The ear adapter ring 41b is essentially realized in a fungiform fashion and, as described above, serves for sealing the phone in the outer ear. A bass attenuation may occur if a seal is produced between the phone and the ear canal. This applies, in particular, to phones with a rigid shape.

10 If a phone is at least partially inserted into and seals the ear canal, the membrane may be damaged due to the excess pressure in the auditory canal. This can be prevented with the utilization of the ear cushion ring 41b, wherein grooves or recesses are provided at least in part of the ring. Due to this measure, air compressed up to shortly before the complete insertion of the phone into an auditory canal can be respectively discharged or escape.

Figure 6 shows an image of an in-ear phone according to a sixth embodiment.
15 The housing 50 of the in-ear phone features a transducer housing 52 for a transducer 53 and is connected to a cable 54. In addition, the in-ear phone features a support element 51 that is essentially aligned with the cable 54. Such a transducer is inserted above the auditory canal and the support element 51 is anchored in the concha. The phone therefore can be securely fixed by means of
20 this two-point anchoring. The support elements 51 and the attachable ring 52a may have different sizes such that the in-ear phone can be adapted to different configurations of an outer ear and the concha.

Figure 7a shows a schematic sectional representation of a section of a storage unit for phones. The storage unit 200 features a recess 203 that is designed in
25 such a way that a phone 211 can be placed therein. A metal plate 202 is arranged on the underside of the recess from outside. The phone 210 shown features an electroacoustic transducer 211 with a magnet. When the phone is placed into the recess 203, the magnet in the electroacoustic transducer 211 and the metallic magnetizable plate 202 cooperate in such a way that the phone 211
30 is magnetically attracted and therefore held in the recess 203.

Figure 7b shows a top view of a storage unit for phones. The storage unit 200 features a recess 203 for each phone 210. A magnetizable disk that preferably consists of iron or nickel or a combination thereof is arranged in this recess 203. The phone 210 is placed into the recess 203 with its electroacoustic transducer pointing downward such that it is held therein due to the magnetic forces between the transducer 211 and the disk 202.

As an alternative to the metal disk 202, it would also be possible to arrange a magnet or a magnet unit in the recess 203 in order to thusly realize the magnetic attraction relative to the electroacoustic transducer 211. In this case, it needs to be observed that this magnetic unit is correspondingly polarized such that the phone 210 is attracted and not repelled.

Figure 8a shows a schematic image of a storage pocket, particularly for ear phones. The storage pocket essentially has a triangular design with a first, a second and a third corner 301, 302 and 303. A first Velcro section 311 is sewn on the first side 300a of the pocket in the region of the first corner 301, and a second Velcro section 312 is sewn on in the region of the second corner 302. The pocket has three folding lines 301a, 302a and 303a.

Figure 8b shows a top view of a second side of the storage pocket. The second side 300b of the storage pocket features a third Velcro section 313 that is sewn on in the region of the second corner 302 and a fourth Velcro section 314 that is sewn on in the region of the third corner 303.

Figure 8c shows another image of the storage pocket according to Figure 8a. In this case, the first corner 301a was folded in along the folding line 302a such that the first sewn-on Velcro section 311 is visible.

Figure 8d shows another image of the storage pocket according to Figure 8a, wherein the second corner 302 is now folded along the second folding line 302a in such a way that the sewn-on Velcro sections 301 and 303 cooperate and connect the first and the second end 301, 302 to one another.

Figure 8e shows another image of the storage pocket according to Figure 8a. In this image, the third corner was folded along the third folding line 303a in such a way that the sewn-on Velcro sections 312 and 314 are connected to one another and the storage pocket is closed. Figure 8d shows the storage pocket in an
5 opened state.

Figure 9a shows an image of another storage pocket and Figure 9b shows another image of the storage pocket according to Figure 9a. In the unfolded state, the storage pocket is essentially triangular and has three corners 301, 302 and 303. One side 300b of the pocket features two sewn-on Velcro sections 313 and
10 314, wherein the Velcro section 313 is arranged in the region of the second corner 303 and the Velcro section 314 is arranged in the region of the third corner 303. Figure 9b shows the other side of the storage pocket according to Figure 9a. On this side 300a, the pocket features a Velcro section 311 that is sewn on in the region of the first corner 301 and a Velcro section 302 that is sewn on in
15 the region of the second corner 302.

In order to fold up the pocket, the first corner 301 is initially folded in along the folding line 301a. Subsequently, the second corner 302 is also folded in along the folding line 302a such that the sewn-on Velcro sections 311 and 313 can be attached to one another. The third corner 303 is ultimately folded along the fold-
20 ing line 303a such that the pocket can be closed and essentially represents a triangle in the closed state.

Although sewn-on Velcro sections were used in the description of Figures 8a to 9b, the foldable storage pocket according to Figures 8a to 9b can also be realized with fastening elements other than sewn-on Velcro sections, for example,
25 snap-fasteners or buttons that can be connected to one another by means of magnetic attraction.

The sewn-on Velcro section 313 or the connecting unit 313 is essentially arranged in the region of the second corner 303 along the edge between the first corner 301 and the second corner 302. The sewn-on Velcro section 314 or the
30 fastening unit 314 is arranged in the third corner 303. The sewn-on Velcro sec-

tion 311 or the fastening unit 311 is arranged in the region of the first corner 301 and essentially aligned toward the edge between the second and the third corner 302, 303. Due to these measures, the sewn-on Velcro sections cannot damage the material of the folding pocket if it is folded up incorrectly.

- 5 Figure 10 shows an image of a phone according to another embodiment. This phone is realized, in particular, in the form of an ear phone. The phone features a line 401 and a phone housing 402. An ear hook 403 is fixed on the phone housing 402 and hooked behind the ear of the wearer while the phone is worn.

The outer side of the phone housing 402 contains a recess 405 that serves for
10 attaching or fixing an exchangeable cover unit 404 thereon. When the snap-on unit 404 is fixed on the recess 405, the acoustic properties of the phone are altered. Consequently, it is possible to purposefully influence the acoustic properties of the phone with differently designed snap-on units 404.

Until now, the acoustic properties of a phone were defined during the develop-
15 ment phase by the geometry of the phone, as well as by the materials used, and could not be readily changed thereafter. In order to adjust an acoustic short circuit, for example, damping materials such as silks, damping papers, foams and the like are used. The selection of the materials makes it possible to influence these properties accordingly. However, it would be desirable to enable the users
20 to adjust the acoustic properties of the phones themselves and therefore to realize an individual adjustment thereof.

In the phone illustrated in Figure 10, this may be realized, for example, by using different snap-on units or covers 404, wherein the snap-on units or covers alter the acoustic properties of the phone. For example, an acoustically effective vol-
25 ume can be produced or altered with the design of the snap-on unit 404. These snap-on units make it possible, for example, to influence the rear volume of the transducer system in the phone 400 such that the acoustic properties of the phone are also altered. In the embodiment shown in Figure 10, the exchangeable acoustic elements are realized in the form of snap-on units 404 and therefore
30 visible from outside.

Alternatively, the exchangeable acoustic elements may also be designed such that they are concealed and not visible from outside. Acoustic elements of this type may be realized, for example, in the form of cartridge-like damping elements that can be screwed in and screwed on. These damping elements or acoustic
5 elements may contain, for example, sponges or can alter or contain defined acoustically effective volumes.

Consequently, it is possible to provide different acoustic elements or damping elements that adapt the acoustic properties of a phone to the individual taste of a user. The acoustic elements or the damping elements may furthermore be
10 adapted to different styles of music such that the phone can be adjusted to a certain style of music by exchanging the damping elements or the acoustic elements, respectively. Consequently, the effect that was achieved until now with the aid of an electronic equalizer, for example, in a reproduction device can be realized directly on a phone.

15 This means that exchangeable damping elements are provided that also have an acoustic function. Such damping elements can be used on head phones, as well as on ear phones, in order to influence the acoustic properties of the phones. The exchangeable damping elements or acoustic elements are preferably realized in such a way that the end users themselves are able to exchange these elements.
20 The damping elements consequently are preferably realized in a snap-in, snap-on or screwable fashion.

A housing of the phone may contain, for example, a recess for inserting or screwing a cartridge-like damping element or acoustic element therein in order to thusly alter the acoustic properties of the phone.

25 The exchangeable damping elements make it possible, for example, to influence the frequency response, the bass response, the treble response and the mid-range response.

If the exchangeable damping elements or acoustic elements are realized in the form of covers for a phone, it is possible, for example, to convert the phone from
30 a closed phone to an open phone by exchanging the cover such that the tuning

behavior of the phone is altered. The conversion of a closed phone into an open phone, for example, by exchanging the exchangeable damping elements may provide the advantage that the environment can be better perceived. This may be particularly advantageous while riding a bicycle. However, if it is preferred to
5 perceive less ambient noise, an open phone can be converted into a closed phone, for example, by exchanging the damping elements.

If the exchangeable damping elements are realized, for example, in the form of covers for a phone, the volume can be influenced behind the ventilation opening by means of the differently designed covers such that the acoustic properties of
10 the phone are altered due to the volume of the ventilation opening. In order to manipulate the reproduction of the phone, the above-described covers may, for example, provide a different volume between the cover and the phone. Alternatively or additionally, the cover may also contain a hole or an opening that also causes an alteration of the acoustic properties of the phone. Although Figure 4
15 clearly shows an ear phone with a hook, the exchangeable acoustic elements can also be implemented on other phones such as, for example, a head phone, an ear phone or an in – ear phone.

Claims

1. A phone, particularly an ear phone, with
a first and a second transducer housing (41, 42) and a flexible head strap
(43) that connects the first and the second transducer housing (41, 42), wherein
5 the head strap (43) is preshaped in such a way that it is coiled up and has at
least one turn in its relaxed, unworn state.
2. The phone according to Claim 1, wherein the head strap (43) is essentially
coiled up in one plane in the unworn state.
3. The phone according to Claim 1 or 2, wherein the head strap (43) features
10 two first sections (43c) that are respectively connected to a transducer housing
(41, 42) and a second section (43d) that connects the two first sections (43c),
wherein the two first sections (43c) essentially extend parallel to the lateral
head sections of a wearer in the worn state and the head strap is bent toward the
back of the head in the two transition areas (43d) between the first and second
15 sections (43c, 43d), and wherein the second section (43d) essentially adapts
itself to the transition between the head and the back of the head and also fea-
tures a bend in the worn state.
4. The phone according to Claim 3, wherein the radius of the bend of the
second section (43d) and the radius of the bend of the transition areas respec-
20 tively depend on the size of the wearer's head.
5. The phone according to one of the preceding claims, wherein the head
strap has a diameter of about 80 to 100 mm, particularly 90 mm, in the relaxed,
unworn state.
6. The phone according to one of the preceding claims, wherein the head
25 strap (43) features a spring steel with a spring constant of about 800 to 1300
N/mm, particularly about 1100 N/mm.

7. The phone according to one of the preceding claims, wherein the first and the second transducer housing (41, 42) are inclined by an angle (α) of about 35-55°, particularly 40°.
8. The phone according to one of the preceding claims, wherein two bending
5 points are provided in the spring steel in the transition areas between the first sections and the second section.
9. The phone according to Claim 8, wherein the bending points (43e) in the spring steel are realized in such a way that a predominant bending direction is achieved.
10. 10. The phone according to one of the preceding claims, wherein the head
strap (43) is coiled up by a coil angle between about 360° and 720°, particularly
between 550° and 630°, in its relaxed state.
11. The phone according to one of the preceding claims, wherein the head
strap (43) is twisted in a predominant direction by about 180°.
12. 12. The phone according to one of the preceding claims, wherein the head
15 strap (43) is bent rearward in its first sections (43c) in its tensioned, worn state
and the second section (43d) that connects the two first sections (43c) forms a
section of a circular path.
13. The phone according to one of the preceding claims, wherein the spring
20 steel is twisted in such a way and the bending points (43e) are realized in such a
way that the head strap (43) is only stabilized in the worn state.
14. The phone according to one of the preceding claims, wherein exchange-
able ear adapter rings (41a, 41b) can be fixed on the transducer housing (41,
42).
15. 15. The phone according to Claim 13, wherein recesses and/or grooves are
25 arranged in the ear adapter rings.

16. An ear adapter ring for an ear phone that serves for being fixed on a transducer housing of a phone and features an inner and an outer edge, wherein recesses and/or grooves in part extend axially toward the inner edge.

17. The ear adapter ring according to Claim 16, wherein the ear adapter ring
5 has a convexly curved cross-sectional surface.

18. The ear adapter ring according to Claim 16 or 17, wherein the recesses and/or grooves are arranged on the circumference of the ear adapter ring in a uniformly spaced-apart fashion.

19. A volume control unit for a phone, featuring a first hollow body (1) and a
10 second body (2) that can be accommodated by the hollow body (1), wherein a potentiometer unit (6) is arranged in the inner body (2) in such a way that the adjustment of the potentiometer unit is varied due to a relative movement between the first hollow body (1) and the second body (2).

20. The volume control unit according to Claim 19, featuring an outer tube unit
15 (1) and an inner tube unit (2), wherein a potentiometer unit (6) is arranged in the inner tube in such a way that the adjustment of the potentiometer unit (6) is varied due to a relative movement between the outer tube and the inner tube.

21. The volume control unit according to Claim 19 or 20, featuring
an outer tube unit (1) with at least one opening (1a),
20 an inner tube unit (2) with a first and a second end (2a) and a slot (2c)
arranged therebetween,
a potentiometer unit (6) that features a projection (6a) on its upper side,
a counterpart (4) that features at least one projection (4a) and is realized in
such a way that the projection engages into the openings (1a) of the outer tube
25 unit (1),

wherein the outer tube unit (1) is pushed over the inner tube unit (2) and
the projection (4a) is inserted into the opening (1a) in such a way that it engages
into the slot (2c) and cooperates with a projection (6a) of the potentiometer unit
(6) in such a way that the adjustment of the potentiometer unit (6) is varied due to

a relative displacement between the outer tube unit (1) and the inner tube unit (2).

22. A head phone with a volume control unit according to Claims 19 to 21.

23. An ear phone, particularly an in-ear phone, with a housing (32) that features a lower section (32a) for being connected to a cable (31), wherein the lower section (32a) has an inner side (32c) that is essentially realized straight, wherein the housing (32) features an upper section (32b) for accommodating the electroacoustic transducer (33), and wherein a concavely curved recess (34, 35) is provided in the transition area between the lower section (32a) and the upper section (32b).

24. A storage box for a phone, featuring two recesses for accommodating the phones, wherein a magnetizable plate and/or disk is arranged in or on the bottom of the recess.

25. A storage pocket for a phone, wherein the pocket essentially has three corners (301, 302 and 303), as well as three predetermined folding lines (301a, 302a, 303a), wherein the first side of the pocket features a first fastening unit (311) that is arranged in the region of the first corner (301) and a second fastening unit (312) that is arranged in the region of the second corner (302), and wherein the second side of the pocket features a third fastening unit (313) that is arranged in the region of the second corner (302) and a fourth fastening unit (314) that is arranged in the region of the third corner (303).

26. The pocket according to Claim 25, wherein the first corner (301) is folded along the first predetermined folding line (301a), and wherein the second corner (302) is folded along the second predetermined folding line (302a) in such a way that the third fastening unit (313) is fastened on the first fastening unit (311).

27. The pocket according to Claim 26, wherein the third corner (303) is folded along the third predetermined folding line (303a) in such a way that the fourth fastening unit (314) is fastened on the second fastening unit (312).

28. A phone featuring
exchangeable acoustic elements, wherein the exchangeable acoustic
elements are designed for influencing the acoustic properties of the phone.
29. The phone according to Claim 28, furthermore featuring a phone housing
5 (402) and at least one recess (405) in the phone housing (402), as well as an
exchangeable acoustic unit (404) that can be detachably fixed on or in the recess
(405).
30. The phone according to Claim 28 or 29, wherein the exchangeable acoustic
units are designed for altering an effective acoustic volume of the phone.
- 10 31. The phone according to one of Claims 28 to 30, wherein the exchangeable
acoustic elements are realized in the form of cartridge-like damping elements that
are placed in a corresponding recess in the phone in order to thusly influence the
acoustic properties of the phone.
32. The phone according to one of Claims 28 to 31, wherein the acoustic unit
15 features at least one acoustically effective opening.