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**Portable Telephone Adapted To Accommodate A
Plurality Of Distinctive Telephone Appearances**

5 The present invention relates generally to portable telephones and more particularly to a portable telephone adapted to accommodate a plurality of distinctive telephone appearances.

10 **Background of the Invention**

 Portable telephones are generally well known in the art. Portable telephones include radiotelephones, such as cellular radiotelephones, cordless radiotelephones and personal communicators. Portable
15 telephones traditionally communicate with a remote base station to provide wireless communications for a user. Portable telephones have become a widely accepted form of wireless communications in the home cordless and cellular radiotelephone markets and are rapidly finding applications into new types of communication systems, such as personal
20 communication systems (PCS).

 Because of such wide acceptance both within and among the communication systems, distinguishing the appearance of portable telephones has become an important need for the customer, the manufacturer and the distributor of the portable telephone. Customers
25 desire a distinguished appearance to meet their personal tastes and preferences. Manufacturers desire a distinguished appearance to provide a variety of telephone appearances to their customers as well as to provide a distinguished appearance for the manufacturer's own product. Distributors desire a distinguished appearance to distinguish themselves
30 in the marketplace from each other to promote their name brand. The desires of all manufacturers, sellers and users to have a distinguished looking portable telephone are eventually communicated to the manufacturer so that the particular distinguished looking portable telephone can be produced.

A portable telephone is conventionally produced by assembling telephone circuitry, including transceiver circuitry and user interface circuitry, within a housing. The user interface circuitry includes a display, a keypad, an earpiece and a microphone. The housing traditionally include
5 a back housing, having a standard molded form, mated to a front housing having a distinguished appearance. The front housing is adapted to provide a variety of distinguished looks by varying its molded contour, texture or color. Typically, the user interface elements are mounted inside the front housing and electrically connected to transceiver circuitry
10 mounted in the back housing. The display and keypad may also each have a distinguished appearance. A distinguished looking front housing, a distinguished looking display and a distinguished looking keypad are selected to create one of a number of appearance combinations thereby giving the portable telephone an overall distinguished appearance.

15 A disadvantage of conventionally producing the distinguished appearances of portable telephones is that the distinguished appearance of a particular portable telephone must be known by the manufacturer before the portable telephone is manufactured. At selected locations throughout a production line, the appropriate front housing, keypad and
20 display, etc. are assembled appropriately to produce the appropriate distinguished appearance for the portable telephone. While this manufacturing technique was acceptable in the past when relatively few distinguished appearances for portable telephones were needed, the large growth in the telecommunications industry has created a demand for a
25 very large number of distinguished appearances for portable telephones. Today a typical manufacturer may be required to track literally hundreds of portable telephone models, each having a unique look. The task of managing such a demand has prompted the need for a new way to manufacture portable telephones to achieve a variety of distinguished
30 appearances that meet the market demand without burdening the production flow.

Furthermore, conventionally produced portable telephones do not permit the user of the portable telephone to alter the appearance of the portable telephone once manufactured or purchased. After market
35 companies have tried to meet the customer's need for their own unique look by providing accessories, such as cases for holding the portable telephones.

However, these cases are clumsy, add weight, and have a limited effect on the appearance of the portable telephone.

Accordingly, there is a need for a portable telephone adapted to accommodate a plurality of distinctive telephone appearances that
5 overcomes the disadvantages of conventionally produced portable telephones.

Brief Description of the Drawings

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FIG. 1 illustrates, in a perspective view, a portable telephone in accordance with the present invention.

FIG. 2 illustrates, in an exploded view, the portable telephone of FIG. 1 in accordance with the present invention.

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FIG. 3 illustrates, in a longitudinal cross-sectional view, the portable telephone of FIG. 1 in accordance with the present invention.

FIG. 4 illustrates, in a longitudinal cross-sectional magnified view, the portable telephone of FIG. 3 in accordance with the present invention.

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FIG. 5 illustrates, in a lateral cross-sectional view, the portable telephone of FIG. 1 in accordance with the present invention.

Summary of the Invention

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In accordance with the present invention, the foregoing need is substantially met by portable telephone adapted to accommodate a plurality of distinctive telephone appearances. According to one embodiment of the present invention, the portable telephone includes a faceplate and a housing. The faceplate has a distinctive user interface
30 appearance. The housing has a body appearance and is adapted to receive the faceplate as one of a plurality of faceplates to provide the distinctive user interface appearance for the portable telephone thereby giving the portable telephone a distinctive telephone appearance. The faceplate is advantageously attached to the housing after a functional portable
35 telephone is produced to streamline manufacturing and offer a greater variety of unique looks.

Detailed Description of a Preferred Embodiment

FIG. 1 illustrates, in a perspective view, a portable telephone 100 in accordance with the present invention. The portable telephone 100 generally includes a housing 101, a faceplate 102, a battery 103 and an antenna 104. In the preferred embodiment of the present invention, the portable telephone 100 is a cellular radiotelephone for operation within a wide area cellular network. Alternatively, the portable telephone 100 may be a cordless radiotelephone, a personal communicator or any other two-way communication device. The portable telephone 100 is portable in that it is handheld by a user and is available for use virtually anywhere within its corresponding communication system.

The portable telephone 100 has a user interface 109 permitting the user to interface with the portable telephone 100. The user interface 109 of the portable telephone 100 generally includes an earpiece interface 105, a display interface 106, a keypad interface 107, a microphone interface 108, and an alert interface 110. The user interface 109 operates in a conventional manner to provide the user with wireless communications.

According to the present invention, the portable telephone 100 is adapted to accommodate a plurality of distinctive telephone appearances. In the preferred embodiment of the present invention, this is accomplished with the faceplate 102 having a distinctive user interface appearance. The distinctive user interface appearance is evidenced by the distinguished appearance, or unique look, that the faceplate gives to the earpiece interface 105, the display interface 106, the keypad interface 107, the microphone interface 108, and the alert interface 110. In the preferred embodiment the distinctive appearance is accomplished by selecting the contour, shape, size, texture, material and color of the faceplate. Other ways to distinguish the appearance of the faceplate may be readily observable by those skilled in the art of industrial design, mechanical engineering or material engineering. Therefore, since the user of the portable telephone 100 typically judges the appearance of the portable telephone based on the user interface 109, the faceplate 102 provides a convenient way to substantially alter the appearance of the portable telephone 100 with minimum effort.

The housing 101 has a body appearance. In the preferred embodiment of the present invention, the body appearance is a conventionally molded housing having a standard appearance. The standard appearance of the housing 101 is not readily changeable other than surface appearance features such as texture and color, or the like. The rationale for this is that the mechanics of the portable telephone have been carefully designed in order to optimize the portable telephone for space, weight, styling, etc. To alter the appearance of the housing 101 to any significant degree would place an unrealistic burden on the designers and producers of the portable telephone 100.

The housing 101 is adapted to receive the faceplate 102 as one many faceplates to provide the distinctive user interface appearance for the portable telephone 100 thereby giving the portable telephone 100 a distinctive telephone appearance. The rationale for this is that the housing 101 can easily change appearances simply by attaching different faceplates. Therefore, anyone of many faceplates 102 may be readily received by the housing 101 to give the portable telephone 100 a distinguished appearance. Further advantages and features of the present invention will be described in more detail below with reference to FIG. 2-5.

FIG. 2 illustrates, in an exploded view, the portable telephone 100 of FIG. 1 in accordance with the present invention. The portable telephone of FIG. 2 generally illustrates the housing 101, a keypad 200, and the faceplate 102. The housing 101 includes user interface elements such as an earpiece 304, a microphone 308, a display 305, a keypad circuit 306 (all shown in FIG. 3), and an alert transducer 501 (shown in FIG. 5) The housing 101 has first 202, second 203, third 204, fourth 205, and fifth 217 apertures. The first aperture 202, disposed opposite the earpiece 304, provides an acoustic interface for the earpiece 304. The second aperture 203, disposed opposite the display 305, provides a visual interface for the display 305. The third aperture 204, disposed opposite the keypad circuit 306, provides a tactile interface for the keypad circuit 306. The fourth aperture 205, disposed opposite the microphone 308, provides an acoustic interface for the microphone 308. The fifth aperture 217, disposed opposite the alert transducer 501, provides an acoustic interface for the alert transducer 501. The housing 101 also has a volume switch 201 permitting

the user to adjust the volume signal sent to of the earpiece 304 or the alert transducer 501.

5 The housing 101 is adapted to receive the faceplate 102 as one of a plurality of faceplates to provide the distinctive user interface appearance for the user interface elements thereby giving the portable telephone a distinctive telephone appearance. The faceplate has first 208, second 209, third 210, fourth 211 and fifth 218 apertures. The first aperture 208, disposed opposite the first aperture 202 in the housing 101, provides an acoustic interface for the earpiece 304. The second aperture 209, disposed
10 opposite the second aperture 203 in the housing 101, provides a visual interface for the display 305. The third aperture 210, disposed opposite the third aperture 204 in the housing 101, provides a tactile interface for the keypad circuit 306. The fourth aperture 211, disposed opposite the fourth aperture 205 in the housing 101, provides an acoustic interface for the
15 microphone 308. The fifth aperture 218, disposed opposite the fifth aperture 216 in the housing 101, provides an acoustic interface for the alert transducer 501.

The keypad 200 is disposed opposite the keypad circuit 306 and between the housing 101 and the faceplate 102 for providing a tactile
20 interface for the keypad circuit 306. Thus, a portion of the faceplate 102 forms a bezel about the keypad 200. In the preferred embodiment of the present invention, the keypad 200 is formed of an elastomeric rubber, as is well known in the art. Alternatively, the keypad 200 may be molded with the faceplate 102 to form a one-piece construction. In this form the keycaps
25 of the keypad could be formed of a molded plastic and molded with the faceplate 102 in a hinged arrangement within each key opening in the faceplate 102. Alternatively, the keypad 200 may be combined with the faceplate 102 to form an integral construction. In this form the keypad 200 and the faceplate 102 are separately formed and joined together thereafter.
30 An example of this construction is membrane structure, wherein the faceplate 102 and the keypad 200 are produced in a stack-up sandwich configuration resulting in an integrated faceplate/keypad structure.

In the preferred embodiment of the present invention, the keypad 200 has a distinctive key appearance thereby also giving the portable
35 telephone a distinctive telephone appearance in addition to that given by the faceplate 102. The key appearance of the keypad 200 can be varied by

changing its shape, size, color, texture, type of illumination (positive or negative image), etc. Other key appearances may be readily apparent to those skilled in the art of keypad design

5 In the preferred embodiment of the present invention, the faceplate 102 is formed of separate units, generally represented by a top plate 207 separated from a bottom plate 206. This construction adds to the diversity of combinations that the faceplate 102 may provide, as well as styling of the faceplate 102. Generally, the faceplate 102 may be separated into as many units, or in at any place as so desired.
10 Alternatively, the faceplate 102 may be formed as a one-piece unit.

In accordance with the present invention, the keypad circuit 306, the keypad 200 and the display 305 may comprise a touch screen module. The touch screen module would span the area presently occupied by the keypad 200 and display 306 and be disposed opposite one large aperture in the front housing 302 and in the faceplate 102. Therefore, the faceplate 102
15 can provide distinctive appearances for a portable telephone 100 having a variety of user interfaces.

As is readily illustrated in FIG. 2, the portable telephone 100 is essentially fully functional without the addition of the keypad 200 and the faceplate 102. One may listen via the earpiece 304, speak into the microphone 308, look at the display 305, and enter data via the keypad circuit 306 using a key-like instrument. In the preferred embodiment of the present invention, no electronic functions reside either with the keypad 200 or the faceplate 200. This construction provides significant
20 advantages to the manufacturer, the seller and the user of the portable telephone 100. With the construction of the present invention, the manufacturer may assemble the portable telephone 100 into a fully functional telephone without knowing the final appearance of the portable telephone.

30 This concept has been similarly implemented in with software that provides the instructions to the telephones circuitry. The portable telephone 100 is "flexed" or configured with a particular software program or features after the phone is assembled in order to provide the portable telephone 100 with unique operating characteristics. In a similar manner,
35 the portable telephone 100 may be mechanically configured to provide a distinctive appearance for the portable telephone 100 at the latest possible

time. The appropriate time to attach the faceplate 102 and the keypad 200 to the housing 101 may be when the phone reaches the end of the production line, when the phone is in the factory's distribution center, at the distributor's warehouse, in the retailer's showroom, or even by the user herself. The combination of flexing the software and assembling the faceplate 102 and keypad 200 provide a unique combination of elements and features to produce a particular model of the portable telephone 100. Therefore, the manufacturer no longer needs to manage the hundreds of distinguished appearances of portable telephones while the portable telephone 100 is being manufactured.

The faceplate 102 may either be removeably attachable to the housing 101 or permanently attached to the housing 101 depending the intentions of the manufacturer. In the preferred embodiment of the present invention, the faceplate 102 is removeably attached to the housing 101 by lip 212, snaps 213 and 214 on the faceplate 102 and by latch holes 215 and 216 in the housing 101. Since FIG. 2 is in perspective not all snaps and latch holes are shown. Alternatively, the faceplate 102 may be attached using Velcro TM, adhesive, etc., or any other attachment means suitable for remaining securely attached to the portable telephone 100 during use and yet be readily removable by the user. In the alternative, the faceplate 102 may be permanently attached to the housing 101 using a permanent adhesive, ultrasonic welding, permanent latch mechanisms, or the like. Thus, the faceplate 102 give the portable telephone 100 a fixed distinct appearance using a permanently attached faceplate 102, or a variably distinct appearance using a removeably attachable faceplate 102.

Since the faceplate 102 and the keypad 200 may be attached to the portable telephone 100 at various points in time throughout the distribution chain, it is conceived that the faceplate 102 alone or in combination with the keypad 200 may be sold as kits. These kits would be available to the user for specific selection at a distribution outlet, a retail store, or by mail order thereby allowing the user to initially choose the distinct appearance of the portable telephone 100 or change the distinct appearance of the portable telephone 100 at a later time.

FIG. 3 illustrates, in a longitudinal cross-sectional view, the portable telephone of FIG. 1 in accordance with the present invention. The

housing 101 generally includes a back housing 301 mated to a front housing 302 to substantially enclose the radiotelephone circuitry. The radiotelephone circuitry includes the earpiece 304, the microphone 308, the display 305, and the keypad circuit 306. The earpiece 304, the display 305, and the keypad circuit 306 are mounted to a printed circuit board 303 and secured in a fixed relationship to the front housing 302 in a conventional manner. The microphone 308 is also secured in a fixed relationship to the front housing 302 in a conventional manner. Other portions of the radiotelephone circuitry, such as the transceiver and audio functions and logic functions are located on another printed circuit board 313.

An acoustic cavity 310 is formed between the earpiece 304 and the faceplate 102 to provide appropriate resonance for the earpiece 304. An acoustic seal 312 surrounds the acoustic cavity 310 for sealing the acoustic cavity 310. In the preferred embodiment of the present invention, the acoustic seal 312 is provided by an adhesive layer. The adhesive layer further surrounds the display 305 and aids in attaching the faceplate 102 to the housing 101. Alternatively, the acoustic seal 312 may be provided by a thin annular seal made from rubber, for example. Another acoustic seal 317 is disposed between the earpiece 304 and the front housing 302 in a conventional manner. A liner 311 is provided over the first aperture 208 of the faceplate 102 between the faceplate 102 and the front housing 302 preventing dust from entering the first aperture 208 but permitting acoustic sound wave to pass through. Thus, the combination of the earpiece 304, the acoustic seals 312 and 317, the front housing 312 and the faceplate 102 create an acoustic cavity for proper operation of the earpiece 304.

A lens 309 is disposed opposite the display 305 to protect the display. In the preferred embodiment of the present invention, the lens is attached to the front housing 312 and covers the second aperture 203 of the housing 101 to prevent dust or other foreign objects from obstructing a view of the display 304. The display is sealed against the front housing 312 by seal 319 to prevent dust or other potential foreign objects from obstructing a view of the display 304. Alternatively, the lens may be attached to the faceplate 102 and cover the second aperture 209 of the faceplate 102.

Posts 315 and 318 are disposed between the faceplate 102 and the printed circuit board 303 to prevent the faceplate 102 from bowing when

depressed between the keys of the keypad 200. In the preferred embodiment of the present invention, the posts 315 and 318 (as well as others not shown) are formed as part of the faceplate 102.

5 Cavities 307 and 320 provide open areas for keypad backlighting 312 and 322. In the preferred embodiment of the present invention, the keypad backlighting 312 and 322 is provided by light emitting diodes mounted to the surface of the printed circuit board 303. Alternatively, other lighting sources such as incandescent may be substituted.

10 FIG. 4 illustrates, in a longitudinal cross-sectional magnified view 314, the portable telephone 100 of FIG. 3 in accordance with the present invention. The printed circuit board has coupled contacts 401 and 403 and contact 402 disposed thereon providing the keypad circuit 306. Located above the keypad circuit 306 and bridging the coupled contacts 401 and
15 403 is a conductive dome 406. The conductive dome 406 provides the keypad 200 with tactile feedback as well as an electrical connection between the coupled contacts 401 and 403 and the contact 402 when the keypad 200 is depressed to collapse the conductive dome 406. The keypad 200 has a plunger 410 for providing localized actuation of the conductive
20 dome 406.

A barrier 407 covers the keypad circuit 306 including all the conductive domes 406 to prevent contamination of the keypad circuit 306 from skin oils, dust, etc. The barrier is conventionally made from a mylar sheet and adhesively attached to the printed circuit board 303. The
25 barrier 407 does cover the keypad backlighting 321 or the contacts 404 or 405 therefor.

The front housing 312 is disposed between adjacent keypad circuitry to provide stability for the keypad 200.

30 FIG. 5 illustrates, in a lateral cross-sectional view, the portable telephone 100 of FIG. 1 in accordance with the present invention. This view in particular illustrates the alert transducer 501 mounted to the printed circuit board 303. A seal 504 acoustically seals the alert transducer 501 against the front housing 302. The fifth aperture 217 of
35 the front housing 302 is aligned with the fifth aperture 218 of the faceplate 102. The adhesive layer 312 is disposed between the faceplate 102 and

the front housing 302. Alternatively, the sound pressure from the alert transducer 501 may be channeled out of the front housing 302. FIG. 5 also provides a view of how the faceplate 102 mates with the front housing 302 to provide an almost undetectable appearance when mated together.

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While the present invention has been described with reference to illustrative embodiments thereof, it is not intended that the invention be limited to these specific embodiments. Those skilled in the art will recognize that variations and modifications can be made without departing from the spirit and scope of the invention as set forth in the appended claims.

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What is claimed is:

Claims



1. A portable telephone adapted to accommodate a plurality of distinctive telephone appearances comprising:
5 a faceplate having a distinctive user interface appearance; and
 a housing having a body appearance, the housing adapted to receive the faceplate as one of a plurality of faceplates to provide the distinctive user interface appearance for the portable telephone thereby giving the portable telephone a distinctive telephone appearance.
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2. A portable telephone according to claim 1:
 wherein the housing includes an earpiece and has a first aperture, disposed opposite the earpiece, for providing an acoustic interface for the earpiece; and
15 wherein faceplate has a first aperture, disposed opposite the first aperture in the housing, for providing an acoustic interface for the earpiece.
3. A portable telephone according to claim 2 further comprising:
20 an acoustic cavity formed between the earpiece and the faceplate; and
 an acoustic seal surrounding the acoustic cavity for sealing the acoustic cavity.
- 25 4. A portable telephone according to claim 2:
 wherein the housing includes a display and has a second aperture, disposed opposite the display, for providing a visual interface for the display; and
 wherein the faceplate has a second aperture, disposed opposite the
30 second aperture in the housing, for providing a visual interface for the display.
5. A portable telephone according to claim 2:
 wherein the housing includes a keypad circuit and has a third
35 aperture, disposed opposite the keypad circuit, for providing a tactile interface for the keypad circuit; and



wherein the faceplate has a third aperture, disposed opposite the third aperture, for providing a tactile interface for the keypad circuit.

6. A portable telephone according to claim 2:

5 wherein the housing includes a microphone and has a fourth aperture, disposed opposite the microphone, for providing an acoustic interface for the microphone; and

10 wherein the faceplate has a fourth aperture, disposed opposite the fourth aperture in the housing, for providing an acoustic interface for the microphone.

7. A portable telephone according to claim 1 comprising:

15 a keypad having a distinctive key appearance thereby giving the portable telephone a distinctive telephone appearance.

8. A portable telephone according to claim 1 wherein the faceplate is removeably attachable to the housing.

20 9. A faceplate for a portable telephone adapted to accommodate a plurality of distinctive telephone appearances, the faceplate having a distinctive user interface appearance, the portable telephone including a housing and a keypad, the keypad having a key appearance and disposed between the housing and the faceplate, the housing having a body appearance and adapted to receive the faceplate as one of a plurality of faceplates to provide the distinctive user interface appearance thereby
25 giving the portable telephone a distinctive telephone appearance.

30 10. A user interface kit for a portable telephone adapted to accommodate a plurality of distinctive telephone appearances, the portable telephone including a housing having a body appearance, the user interface kit comprising:

35 a faceplate having a distinctive user interface appearance and adapted to be received by the housing as one of a plurality of faceplates to provide the distinctive user interface appearance for the portable telephone thereby giving the portable telephone a distinctive telephone appearance; and



a keypad having a distinctive key appearance and disposed between the housing and the faceplate.