the cavity **20**. It should be appreciated that the moat **77** may define mesas of shapes other than circular such as rectangular, square, etc. as well.

[**0055**] **FIGS. 20 and 21** illustrate a convex or dome shaped mesa **22**. The convex mesa forms a tactile switch without moving parts. Moreover, because the boundary of the acoustic cavity is defined by a gradual slope as opposed to an abrupt edge, the acoustic switch is more tolerant of transducer misalignment. The mesa **22** of **FIGS. 20 and 21** is formed by removing material from the substrate to form the moat **77** and to contour the shape of the convex mesa **22**. In this embodiment, the transducer is preferably mounted on a flat surface of the acoustic cavity, i.e. on the substrate surface opposite the dome **22** as shown in **FIG. 21**. It should be apparent that the dome shaped mesa **22** need not be surrounded by a moat.

[**0056**] The size of the acoustic cavity **20** defined by the length and width or the diameter thereof can be much smaller than the area identified by the indicia **16** indicating the position of a switch **12** so as to minimize the size of the transducer **26** and thus reduce the cost of the acoustic wave switch **12**. It has been found that a finger does not have to completely cover the touch surface **28** of the acoustic cavity **20** in order to absorb sufficient amount of energy to be easily detected.

[**0057**] Various methods can be used to indicate the position of the switch **12**. The indicia **16** indicating the position of the switch **12** can be formed with polyurethane paint. These paints do not drastically reduce the Q of the cavity. For a metal substrate **14** such as aluminum, anodization can provide striking contrasts. The coating is essentially aluminum oxide with a dye incorporated into the oxide via additives in an anodization bath. This method creates rugged indicia. Other methods that can be employed to create the indicia to identify the switch position are laser, mechanical or chemical engraving. With this method, an outline **80** of the switch position is preferably formed in an area outside of the acoustic cavity. Although the numeral indicia **81** is at least in part formed in the touch surface **28** of the acoustic cavity **20** the removal of the slight amount of mass to form the numeral indicia **81** does not effect the operation of the acoustic cavity **20**. For glass and ceramic substrates **12**, the indicia identifying the switch position can be painted on the substrate. In the case of glass and other transparent substrates, the indicia can be formed on the back surface of the substrate opposite the touch surface so that a coating providing the indicia is not exposed. The switch positions can also be identified by either a depressed or raised region formed in the substrate as discussed below.

[**0058**] As shown in **FIG. 10**, the indicia identifying the position of the switch **12** is a depressed region **90**. The touch responsive surface **28** of the acoustic wave cavity **20** is generally centered in the depressed region **90**. Because in practice, not all of the acoustic wave energy will be trapped within the cavity **20**, it is preferred that the walls **92** of the depressed region be spaced from the walls **94** of the acoustic cavity **20** by a distance that is greater than or equal to 0.6 b_c/n. As can be seen from **FIG. 10**, with this minimum spacing, even though the thickness of the substrate outside of the depressed region is greater than the thickness of the acoustic cavity **20,** the acoustic cavity **20** still has a mass per unit area greater than that of the substrate **14** adjacent to the cavity so as to enable the acoustic wave energy to be substantially trapped in the cavity **20**. In **FIG. 11**, the indicia identifying the switch position **12** is a raised region **96**. Again in this embodiment, the side wall **97** of the raised region **96** should be spaced a distance from the edge **94** of the acoustic cavity **20** by a distance that is greater than or equal to 0.6 b_c/n so as to prevent leaked acoustic energy at the edge **97** from effecting the operation of the cavity **20**. In the embodiment in **FIG. 12**, the raised surface **96** indicating the position of the switch **12** also forms the mesa **22** with the transducer **12** mounted directly on the back surface **29** of the acoustic cavity **20** and substrate **14**. In this embodiment, the minimum spacing between the edge of one mesa **22** and an adjacent mesa is 0.6 b_c/n.

[**0059**] Feedback to the user that the switch **12** has been actuated can be provided by a number of different methods. For example, the detection circuitry can actuate a beeper or the like to provide sound feedback to the user that a touch has actuated the switch **12**. Alternatively, the circuit can actuate a light or the like to provide visual feedback. Tactile and audible feedback can be provided in accordance with the embodiments depicted in FIGS. **13**-**15**. In this embodiment, an acoustic wave absorbing switch actuator **100** is positioned over the touch surface **28**. The switch actuator **100** is formed of a metal or plastic dome **102** or the like with an acoustic wave absorbing material or coating **104** on the inner surface thereof. The acoustic wave absorbing material **104** may be a urethane rubber or the like. When the actuator **100** is depressed by a finger as depicted in **FIG. 14**, the acoustic wave absorbing material **104** touches the touch surface **28** of the switch **12** so as to actuate the switch. Tactile feedback is provided when the touch surface **28** is contacted by the switch actuator **100**. Further, when the dome deforms, a clicking sound may be produced to provide an audible feedback. An overlay **106**, as depicted in **FIG. 15**, and formed of silicone rubber or the like can be positioned over the switch actuators **100** to provide a smooth top surface.

[**0060**] FIGS. **22**-**25** illustrate alternative embodiments for providing feedback to the user that the switch has been actuated. In **FIGS. 22 and 23**, a polymer sheet **120** which may be made, for example of a molded silicone, overlays the substrate **14**. The sheet **120** is molded with domes **122** formed therein. The domes **122** are positioned on the sheet **120** so that each dome is above a respective acoustic switch formed by the mesa **22** and transducer **26** on a substrate surface opposite the sheet **120**. An acoustic wave absorbing material **124** as shown in **FIG. 22** is mounted or coated on the concave surface of the dome facing the touch surface **28** of the switch so that when the dome is depressed the acoustic wave absorber **124** contacts the touch surface **28** of the switch. In **FIG. 23**, instead of an individual acoustic wave absorber **124** associated with each dome **122**, a sheet of acoustic wave absorbing material directly overlays the substrate **14** and is disposed between the substrate **14** and the polymer sheet **120** with molded domes. When an individual dome is pressed, exerting a force or pressure on an area of the absorbing sheet **120** overlaying the acoustic cavity, the impedance of the transducer changes indicating actuation of the switch. **FIGS. 24 and 25** illustrate different embodiments similar to **FIGS. 22 and 23** respectively, but the sheet **120'** is formed of metal with truncated domes **122'** stamped therein. When the domes **122'** are depressed actuating the switch, the domes click providing audible as well as tactile feedback. It is noted that the acoustic absorber **124** of **FIGS.**