element **1004** connected to the second set of pivoting elements **1002**, the first set of pivoting elements **806**, **808** will be unlocked and thereby allows the first series of pivoting elements to return to a neutral position due to tension in the flexible skin. This provides a type of bi-stable shape memory alloy actuation scheme. As shown, an end of a biasing element **1006** such as a spring is fixedly attached to a portion of the housing or any other suitable structure and another end is caused to contact a portion of the pivotal second set of elements **1002**. The pivotal second set of elements may be made of any suitable structure such as plastic that suitably bends about a pivot point shown as **1008**. As shown, a portion of the pivoting elements **1002** are also fixedly attached to a structure of the device to prevent movement of an end thereof. Similarly, the shape memory alloy element **1004** associated with each locking element **1002** also has a portion connected to the element **1002** as well as a fixed structure. The locking element swings as shown, in this example in plane of the FIG. **10***b*, for example, to block the hinged element **808** from lowering down into the plane of the page as shown. As such, the locking feature moves in the plane of the surface to lock the hinged elements. This as opposed to, for example, moving out of the plane in an opposite direction of the hinged element, which may also be done if desired. The thickness of the overall implementation, however, may be less if the locking element is caused to move in plane to the figure as shown. In this example, the hinged elements **808** rise out of the plane when actuated by an SMA element or actuator (not shown) and is blocked by the locking element moving in plane of the figure as shown. It will be recognized that although a single locking element **1002** is shown, that a suitable array of locking elements may be positioned for any respective pivoting hinged element **808**. In addition, it will be recognized that in this example, a configuration as shown that provides a passive lock and an active unlock condition. However, it will be recognized that by reversing the bias element and the shape memory alloy element **1006** and **1004** respectively, that an active lock and a passive unlock structure may be employed. Hence, one or more pivoting elements serves as a type of pivot lock structure made of a shape memory alloy, the same type for example, as noted above. The pivot lock structure is coupled to the control logic **200** and is controlled to be positioned to lock the pivoting elements in a desired position. The pivot lock structure may be alternately positioned to passively lock the pivoting elements in a desired position, and then controlled to release them when desired. As such the control logic controls the second shape memory alloy to deactuate the hinge lock structure to unlock the plurality of hinged elements in response to a passive actuation of the hinge lock structure.

[0057] A method for actuating a controllable skin texture surface includes, for example, controlling the first shape memory alloy to actuate the plurality of pivoting elements. In response to the actuation, the pivot lock structure will naturally act to lock the plurality of pivoting elements in a first position. The method includes deactivating the first shape memory alloy in response to the pivot lock structure being actuated. This allows the current to the first pivoting element to be removed and it is locked in place. The method may also include then unlocking the hinged elements by, for example, by actuating the first shape memory alloy and then controlling the second shape memory alloy to unlock the hinge lock structure by applying current to the shape memory alloy actuator that moves the lock structure to unlock the pivoting elements from their raised position.

[0058] FIG. **11** illustrates a portion of a portable electronic device that employs an embodiment of a controllable skin texture surface, and in this example, the portion of the electronic device is shown to be a keypad. In this example, the controllable skin texture surface includes a skin texture surface actuation structure that includes a hydraulic actuation structure that causes a change in tactile configuration of a flexible skin structure in response to movement of fluid underneath the flexible skin structure. FIGS. **12** and **13** are cross sectional views of a portion of FIG. **11** and will be described together with FIG. **11**. A flexible skin structure **1100** similar to that described above with respect, for example, to FIG. **3** and elsewhere, includes fluid chambers or pockets **1102** corresponding to desired texture features that are molded into a reverse surface of the flexible skin structure. As also shown above, the wall thickness of the pockets may be thinner than other portions of the flexible skin texture to allow less resistance to fluid expansion. The flexible skin structure **1100** is bonded, for example, to a surface of the housing of the portable electronic device to form suitable seals around the various fluid chambers **1102**. A supporting substrate **1104** which may be the housing of the device or a separate substrate within the device, includes fluid channels **1106** formed therein that are positioned to be in fluid communication with the fluid chambers **1102**. It will be recognized that any suitable structure of first channels **1106** may be used including separate channels that allow the activation of any suitable texture location, depending upon the desired application.

[0059] As shown in FIGS. **12** and **13** for example, when fluid is removed from the channels **1106**, the flexible skin structure **1100** is flat or in an unactuated state, and when an appropriate amount of fluid is moved into the various chambers, the flexible skin structure is actuated at appropriate locations to provide a three dimensional pattern on an outer surface of the portable electronic device. As shown, the channels **1106** are fluidly connected with one or more manifolds **1108** that may be molded into a surface of the housing or substrate **1104** or be a separate structure if desired. Separate positive displacement pumps (not shown) or one pump may be fluidly coupled to an inlet **1110** in each of the manifolds. The manifolds **1108** as described are in fluid communication with one or more fluid reservoirs via one or more pumps. Control logic **200** sends the appropriate control information to cause the positive displacement pumps to transfer fluid from an internal reservoir (not shown) in the device through the manifold and into the channels and hence the chambers molded into the rear surface of the flexible skin structure **1100**. The hydraulic actuation structure includes in this example, the substrate **1104** that includes one or more fluid channels **1106** and the flexible skin structure **1100** is suitably affixed to the substrate either directly or through any suitable intermediate structures. The flexible skin structure **1100** includes a plurality of fluid pockets also shown as **1102** corresponding to texture features. The fluid pockets **1102** are in fluid communication with the fluid channels **1106** to allow fluid to be added to or removed from the chamber to actuate or deactuate the respective texture feature.

[0060] In one example, as noted above, fluid pumps may be controlled via control logic. In another embodiment, the pumps may be activated via mechanical movement of a movable portion of the housing, such as a movement of a clam shell such that, for example, the rotational movement of a