A home appliance includes an appliance body, a front panel mounted to the appliance body and defining a self-locking aperture, and a generally cylindrical electrical element having an electrical element body mounted to the front panel in registry with the self-locking aperture, wherein the panel defining the self-locking aperture has a self-locking assembly for engaging and altering the structure of the electrical element body to retain the electrical element in place.
Abstract of the Disclosure

A home appliance includes an appliance body, a front panel mounted to the appliance body and defining a self-locking aperture, and a generally cylindrical electrical element having an electrical element body mounted to the front panel in registry with the self-locking aperture, wherein the panel defining the self-locking aperture has a self-locking assembly for engaging and altering the structure of the electrical element body to retain the electrical element in place.
HOME APPLIANCE WITH SELF-LOCKING APERTURE

Background of The Invention

[0001] The present invention relates broadly to home appliances such as ranges for cooking and, more particularly, to ranges having panel-mounted electric components and a panel configured to retain such electrical components.

[0002] In general, ranges include some form of body-mounted electrical component or element whether it be a rheostat for control of electrical cooking components or an automatic oven light switch. In addition, ranges are generally equipped with one or more internal cavities for cooking that are ovens, steamers or a combination of the two. Each cavity is covered by a door movable between an open, access position and a closed, cooking, self-clean or nonuse position. The oven cavity is often equipped with a light which automatically illuminates upon opening the door. Further, the light extinguishes upon closing the door. This lighting is often controlled by a body mounted electrical component such as a plunger switch that is positioned to operably encounter the door as it is open and closed.

[0003] Generally, plunger switches are mounted on front panels of ranges within the travel path of the door. Such front panels can include metal sheets that are bent, stamped, or otherwise manipulated into predetermined shapes including predetermined openings and apertures to accommodate various structures including electrical components such as the oven light plunger switch.

[0004] It is desirable that such electrical components fit snugly within designated apertures for solidly mounting the switch, or control in place. Such solid mounting helps to prevent vibration or twisting forces from interfering with the good operation of the switch and enhances the overall quality and appearance of the home appliance.
[0005] In the past, such switches and controls were mounted to the home appliance with some form of fastener, such as spring clips or other type of resilient holding devices that may or may not provide adequate retention of the electrical component, and can result in the electrical component being difficult to install and remove. Often, in the case of plastic-bodied switches such as the plunger switch for the oven light, a plastic snap fastener is provided as a part of the switch body. While generally effective in maintaining the switch in a generally operable condition, such prior fastening arrangements tend to provide a less-than-secure fit, sometimes allowing the switch to rotate or otherwise move about within the aperture which can give rise to problems, both operational and cosmetic. Further, the switch may be difficult to install and remove.

[0006] There currently exists a need for a solidly mounted switch in a home appliance that overcomes the tendency of the switch to rotate or move about given current mounting arrangements.

Summary of the Invention

[0007] The present invention is intended to provide a mounting arrangement for an electrical element in a home appliance such as a range, wherein the mounting arrangement resists further movement of the electrical element once it is mounted to the range.

[0008] The present invention is also intended to provide such a mounting arrangement that is cost effective and that does not add complexity to the range manufacturing process.

[0009] To those ends, the present invention is directed to a home appliance including an appliance body and a front panel mounted to the appliance body and defining a self-locking aperture. A generally cylindrical electrical element having an electrical element body is mounted
to the front panel in registry with the self-locking aperture. The panel defining the self-locking aperture has a self-locking assembly for engaging and altering the structure of the electrical element body to retain the electrical element in place.

[0010] Preferably, the electrical element has a plastic body and the self-locking assembly includes a plurality of gripping members on the panel defining the aperture, the gripping members projecting toward the center of the aperture for engagement with the electrical element body. Further, the gripping members penetrate the surface of the electrical element body for gripping the electrical element body, thereby altering the structure of the electrical element body.

[0011] It is preferred that the plurality of gripping members includes a plurality of wedge-shaped projections formed integrally with the panel defining the aperture and having sharp edges for penetrating the surface of the electrical element body. Preferably, eight gripping members are formed in the panel defining the aperture at regular intervals around the aperture to engage the electrical element body to prevent free rotation of the electrical element body.

[0012] It is further preferred that the eight gripping members include eight wedge-shaped projections having sharp edges for penetrating the surface of the electrical element body. Preferably, each of the wedge shaped projections includes two walls that diverge from a sharp distal end to the panel at a predetermined angle and extend to the panel. It is preferred that the walls diverge at about a forty degree (40°) angle. Preferentially, each gripping member extends about 0.7 mm from the panel wall defining the aperture.

[0013] It is preferred that the electrical element is a plunger switch.

[0014] The present invention is also more specifically directed to a range including a range body and a front panel mounted to the range body and defining a self-locking aperture. A generally cylindrical electrical element having an electrical element body is mounted to the front
panel in registry with the self-locking aperture. The panel defining the self-locking aperture has a self-locking assembly for engaging and altering the structure of the electrical element body to retain the electrical element in place.

[0015] Preferably, the electrical element has a plastic body and the self-locking assembly includes a plurality of gripping members on the panel defining the aperture, the gripping members projecting toward the center of the aperture for engagement with the electrical element body. Further, the gripping members penetrate the surface of the electrical element body for gripping the electrical element body, thereby altering the structure of the electrical element body.

[0016] It is preferred that the plurality of gripping members includes a plurality of wedge-shaped projections formed integrally with the panel defining the aperture and having sharp edges for penetrating the surface of the electrical element body. Preferably, eight gripping members are formed in the panel defining the aperture at regular intervals to engage the electrical element body to prevent free rotation of the electrical element body.

[0017] It is further preferred that the eight gripping members include eight wedge-shaped projections having sharp edges for penetrating the surface of the electrical element body. Preferably, each of the wedge shaped projections includes two walls that diverge from a sharp distal end to the panel at a predetermined angle and extend to the panel. It is preferred that the walls diverge at about a forty degree (40°) angle. Preferentially, each gripping member extends about 0.7 mm from the panel wall defining the aperture.

[0018] It is preferred that the electrical element is a plunger switch.

[0019] By the above, the present invention provides a range having a front panel with an integral self-locking aperture to retain an electrical component in element in place, while allowing efficient and effective installation and removal.
Brief Description of the Drawings

[0020] Figure 1 is a perspective view of a home appliance, particularly a range, having a switch mounted to a front panel in a self-locking aperture according to the preferred embodiment of the present invention;

Figure 2 is a perspective view of the front panel defining the aperture as seen in Figure 1;

Figure 3 is a front view of the self-locking aperture and the front panel of a home appliance illustrated in Figure 2;

Figure 4 is a front view of a gripping member identified at circle 4 in Figure 3;

Figure 5 is a perspective view of a plunger switch being inserted into a self-locking aperture according to the preferred embodiment of the present invention; and

Figure 6 is a perspective view of the plunger switch illustrated in Figure 5 engaged with the gripping members of the self-locking aperture of the present invention.

Description of the Preferred Embodiment

[0021] Turning now to the drawings and more particularly to Figure 1, a home appliance in the form of a range with a self-locking aperture is illustrated generally at 10 and includes a floor-standing, box-like range body 12. The range body 12 consists of a number of panels overlying a skeletal frame (not shown). A front panel 14 covers a major portion of the front of the range 10 and is typically fabricated from sheet metal to define several openings including a steamer cavity 16 and an oven cavity 20 disposed in a side-by-side relationship. A control panel 24 is located above the steamer 16 and oven 20. The steamer 16 is covered by a door 18 while a
similar door 22 covers the oven. The doors 18, 22 are movable between an open state wherein
the respective cavity is available in a closed state for use during cooking, self-cleaning or general nonuse.

[0022] A plunger switch 62 is mounted to the front panel 14 in the path of the steamer
door 18. The plunger switch 62 controls lighting inside the steamer cavity 16 in an automatic
manner based on door position. The steamer door 18 is used as an example in the present case
and it is generally known that a similar plunger switch can also be used with the oven door 22 to
control oven illumination.

[0023] As seen generally in Figure 5 and Figure 6, the plunger switch 62 is an electrical
component that includes a plastic body 64 covering a switch actuator and associated wiring. It is
installed in the front panel 14 during manufacture and it is desirable that the switch not be easily
rotatable or otherwise movable, although the ability to remove the switch for replacement is a
requirement.

[0024] With reference to Figure 2, the front panel 14 is shown to define an aperture 30
where the plunger switch 62 is inserted. A integral self-locking assembly or arrangement is
illustrated as a group of wedge-shaped projections extending radially inwardly from the panel
wall 14 defining the aperture 30. The eight teeth 34, 36, 38, 40, 42, 44, 46, and 48 are spaced at
regular intervals around the aperture 30 as seen in Figures 2 and 3. For example, the second
tooth 36 is angularly displaced from the third tooth 38 by an angle of 45° indicated at 50 in
Figures 2 and 3. While about eight is a sufficient number of teeth to engage and support an
electrical component such as the present plunger switch 62, more teeth than about eight may be
too difficult to use during manufacturing when inserting the electrical component into the
opening and much fewer teeth than about eight may provide inadequate support. It has therefore
been found that eight teeth approaches the most effective number of gripping members to
provide a robust fit and sufficient gripping action while allowing relatively ease of insertion and removal, as during manufacture and repair.

[0025] As seen in Figure 2, each of the teeth is formed in the same manner. Each tooth 34, 36, 38, 40, 42, 44, 46 and 48 includes two walls 52, 54 which converge from the panel wall 32 to a sharp edge 56. With reference to Figure 3, the teeth are seen face-on and the first tooth 34 is highlighted by a circle 4.

[0026] It should be noted that the teeth are illustrated in somewhat of an exaggerated size for clarity. As seen in Figure 4, the teeth have certain predetermined dimensions for effective gripping action. The angle between the walls 52, 54 indicated at 60 should be about 40°. The height or inwardly-directed extent of each tooth is illustrated at 58 and should be about 0.7 millimeters. It is with these dimensions that the teeth can penetrate the plastic body of the plunger switch or electrical component sufficiently for gripping effectiveness yet still remain relatively easy to install and remove.

[0027] Turning now to Figure 5, a plunger switch 62 is illustrated as a generally cylindrical switch having an actuator projecting outwardly for operative interaction with a door, and a plastic body 64 that is also generally cylindrical and is a complimentary diameter to the aperture 30. The switch 62 is moved into registry with the aperture 30 and inserted in the aperture 30. As seen in Figure 6, the teeth 34, 36, 38, 40, 42, 44, 46 and 48 penetrate the plastic surface of the switch body 64 sufficient to alter the structure of the switch body 64 as indicated at 66. It will be understood by those skilled in the art that after the switch 62 enters the aperture 30 and is further inserted, furrows are defined in the switch body 64 by the teeth which end up gripping the switch body 64 and supporting it against rotation, vibration or other movement.

[0028] By the above, the present invention provides a simple and effective gripping arrangement for a plastic or other deformable material switch or other electrical component that
allows ease of installation while offering a robust and tight fit and resists rotation and vibration of the switch to maintain the switch in a fixed, usable condition in the home appliance.

[0029] It will therefore be readily understood by those persons skilled in the art that the present invention is susceptible of a broad utility and application. While the present invention is described in all currently foreseeable embodiments, there may be other, unforeseeable embodiments and adaptations of the present invention, as well as variations, modifications and equivalent arrangements, that do not depart from the substance or scope of the present invention. The foregoing disclosure is not intended or to be construed to limit the present invention or otherwise to exclude such other embodiments, adaptations, variations, modifications and equivalent arrangements, the present invention being limited only by the claims appended hereto and the equivalents thereof.
What is claimed is:

1. A home appliance comprising:
   an appliance body;
   a front panel mounted to the appliance body and defining a self-locking aperture; and
   a generally cylindrical electrical element having an electrical element body mounted to
   the front panel in registry with the self-locking aperture, wherein the panel defining the self-
   locking aperture has a self-locking assembly for engaging and altering the structure of the
   electrical element body to retain the electrical element in place.

2. The home appliance of claim 1 wherein the electrical element has a plastic body and the
   self-locking assembly includes a plurality of gripping members on the panel defining the
   aperture, the gripping members projecting toward the center of the aperture for engagement with
   the electrical element body, wherein the gripping members penetrate the surface of the electrical
   element body for gripping the electrical element body, thereby altering the structure of the
   electrical element body.

3. The home appliance of claim 2 wherein the plurality of gripping members includes a
   plurality of wedge-shaped projections formed integrally with the panel defining the aperture and
   having sharp edges for penetrating the surface of the electrical element body.

4. The home appliance of claim 2 wherein eight gripping members are formed in the panel
   defining the aperture at regular intervals to engage the electrical element body to prevent free
   rotation of the electrical element body.

5. The home appliance of claim 4 wherein the eight gripping members include eight
   wedge-shaped projections having sharp edges for penetrating the surface of the electrical element
   body.
6. The home appliance of claim 1 wherein each wedge shaped projection includes two walls that diverge from a sharp distal end to the panel at a predetermined angle and extend to the panel.

7. The home appliance of claim 6 wherein the walls diverge at about a forty degree (40°) angle.

8. The home appliance of claim 4 wherein each gripping member extends about 0.7 mm from the panel wall defining the aperture.

9. The home appliance of claim 1 wherein the electrical element is a plunger switch.

10. A range comprising:
    an appliance body;
    a front panel mounted to the appliance body and defining a self-locking aperture; and
    a generally cylindrical electrical element having an electrical element body mounted to the front panel in registry with the self-locking aperture, wherein the panel defining the self-locking aperture has a self-locking assembly for engaging and altering the structure of the electrical element body to retain the electrical element in place.

11. The range of claim 10 wherein the electrical element has a plastic body and the self-locking assembly includes a plurality of gripping members on the panel defining the aperture, the gripping members projecting toward the center of the aperture for engagement with the electrical element body, wherein the gripping members penetrate the surface of the electrical element body for gripping the electrical element body, thereby altering the structure of the electrical element body.
12. The range of claim 11 wherein the plurality of gripping members includes a plurality of wedge-shaped projections formed integrally with the panel defining the aperture and having sharp edges for penetrating the surface of the electrical element body.

13. The range of claim 11 wherein eight gripping members are formed in the panel defining the aperture at regular intervals to engage the electrical element body to prevent free rotation of the electrical element body.

14. The range of claim 13 wherein the eight gripping members include eight wedge-shaped projections having sharp edges for penetrating the surface of the electrical element body.

15. The range of claim 10 wherein each wedge shaped projection includes two walls that diverge from a sharp distal end to the panel at a predetermined angle and extend to the panel.

16. The range of claim 15 wherein the walls diverge at about a forty degree (40°) angle.

17. The range of claim 13 wherein each gripping member extends about 0.7 mm from the panel wall defining the aperture.

18. The range of claim 10 wherein the electrical element is a plunger switch.
FIG. 4