SAFETWIST WALL OUTLET
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ABSTRACT

Electrical outlets: A necessity in the modern home, but a safety hazard to children none the less. Good parents are well aware of the risk posed by electrical shock, but try as they might to circumvent the danger, the reality is that currently available products aren’t cutting it. The SafeTwist will virtually eliminate this threat, via a built-in mechanism that deactivates the outlet when not in use.

The modern tamper resistant outlet does not prevent injury caused from children inserting hairpins into sockets. As hairpins are the most commonly inserted objects into outlets, the SafeTwist was designed to resolve this problem by removing current flow from the outlet.

FUNCTION AND FORM

Key Features
- Rotating faceplate bezel, only allowed to rotate after sufficient force is applied
- Internal circuit deactivator supplies voltage only when in the proper position
- Acrylic indicator LED, glows bright red when outlet is live

MODELING AND ANALYSIS

The educational package of SolidWorks 2010 was used extensively in the modeling and analysis of the SafeTwist electrical outlet. Modeling was done in a methodical manner, starting with the most critical part, the circular twist guard. The rest of the assembly was then built around the guard’s dimensions, making sure that critical dimensions, such as the location of the prongs, were respected tightly.

Finite element analysis was then performed in order to simulate stress that could be experienced in real life situations. The graphic on the left demonstrates the pinching of the guard in order to twist it. The resulting strain/displacement was analyzed to ensure that it would not slip out of its track. The second picture illustrates the stress that would be endured by the two tabs if a large force was applied on the front face of the guard. Because these tabs are known weak points in the design, it was important to make sure they would not yield under a substantial applied pressure.

CONCLUSION

The SafeTwist outlet design has the potential to revolutionize the way parents protect their children from the risk of electrical shock. Rather than physically blocking the outlet, the rotating mechanism disengages the leads preventing any accidental shock.

PROTOTYPING

A proof of concept model was constructed to demonstrate the basic working principles and the function of our design. Our model is composed of purchased parts and materials and assembled in a way to show the basic mechanics of motion.

REFERENCES

National Electric Code 2008:
- 314.4, 406.2, 406.4, 406.5, 406.7
Mrelectric.com

BENCHMARK & DESIGN REQUIREMENTS

Design requirements were found by completing research and benchmark testing. Safety and aesthetic quality were among the top priorities in our design objectives.
- Must remove voltage from the circuit when not in use
- Must be operable by adults, and not by children
- Must conform to all U.S. electrical codes
- Ease of installation, should not require modification to the fixture, or require special tools
- High quality and aesthetic appeal to customer base

MODELING AND ANALYSIS

Figure 3. The SafeTwist Wall Outlet

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