The Design of a Power Plug Retainer

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Abstract. Due to the increasing use of electrical appliances in homes and office spaces at the present day, a large number of electrical appliances and fewer sockets leads to a variety of power cords crisscross and messy scattered. This not only affects the appearance, but also has the potential safety hazards of short circuit or electric shock. This paper innovatively designed a power plug retainer with a simple structure and low price. The designed power plug retainer has obtained the national invention patent authorization, which has a strong practicability and broad market prospect.

1. Introduction

With the improvement of human living standards, more and more electrical appliances are used in homes and office spaces, for instance, rice cookers, microwave ovens, kettles, hair dryers, air conditioners, and purifiers, etc., especially in the kitchen and bathroom. Due to the large number of electrical appliances and fewer sockets, various power cords are intertwined in a dense manner, which is neither elegant nor safe.

These power cords and plugs are easy to accumulate a lot of dust and are very inconvenient to replace or adjust. Moreover, when the plug is replaced and the appliance is not removed, the unplugged plugs are relatively messy, and massive power cords will also cause great safety hazard.

Sometimes the unplugged plug may accidentally touch the ground. If this happens in the bathroom, the plug that dropped on the ground is likely to be splashed with water. If it is not detected in time, when the plug is plugged in, the water droplets stuck on the plug may be conductive when connected to the power supply, which will cause danger, electric shock, or even fire. Thus, it is extremely significant to design a power plug retainer that is simple in structure, convenient to use, and low in cost.

2. Structural design of the plug retainer

Top view of the power plug retainer designed in this paper has is shown in Figure 1, Figure 2 presents a front view of the design, and a schematic diagram of a state in which the power cord is pressed into the power plug retainer is shown in Figure 3. The power plug retainer consists primarily of a base panel, a first elastic arm fixed at both ends of the base panel, and a second elastic arm which is at least partially located between the first elastic arm and the base panel.

A first recessed portion and/or a first recessed portion is disposed on the first resilient arm, and the second recessed arm is provided with a second recessed portion that cooperates with the first recessed...
portion and/or the first recessed portion and/or the second recessed portion, the base panel, the first elastic arm and the second elastic arm form a hollow closed structure, and the power cord of the plug does not run out of this structure, and the hollow width of the closed structure is smaller than the size of the plug, but larger than the diameter of the power cord. The plug will not fall out of the closed structure.

In order to facilitate the power cord of the plug to be pressed into the closed structure, the first free end of the first elastic arm is bent outward, and an inlet is formed between the first free end of the first elastic arm and the second elastic arm to facilitate the power line to be pressed in. The third elastic arm is provided with a third recessed portion, and the second free end of the second elastic arm is located in the third recessed portion to improve the closing stability of the first elastic arm and the second elastic arm.

To prolong the lifetime of the second elastic arm, an elastic reinforcing rib is fixed between the second elastic arm and the base panel. Installation holes are provided at both ends of the base panel but not limited to this method. Also, an adhesive layer may be provided on the mounting surface of the base panel. The first elastic arm and the second elastic arm are made of engineering plastics, which have strong deformation capability and long service life but are not limited to engineering plastics and can also be made of metal materials.

In order to arrange the multiple power lines neatly and avoid winding, the base panel is provided with at least one elastic baffle but is not limited to the base panel. Also, at least one elastic baffle can be disposed on the second elastic arm. The elastic baffle is tilted to facilitate the arrangement of the power lines and improve the efficiency of the arrangement.

Figure 1 Top view of the plug retainer

Figure 2 A front view of the plug holder
3. Specific Application of Plug Retainer

The power plug retainer designed in this paper is specifically applied to the socket devices. The structure diagram of the socket device is shown in Figure 4. The figure includes at least one socket fixed on the wall. The power plug retainer is fixed on the wall and the base panel is screwed through the installation hole on the wall.

However, it is not limited to this method. The base panel may be adhered to the wall surface through the adhesive layer, and the power cord of the plug passes through the plug retainer, and the plug rests on the plug retainer.

While the device is in use, the base panel is fixed at an appropriate distance below the socket, and the power cord of the plug is pressed against the second elastic arm so that there is a gap between the first elastic arm and the second elastic force; the power cord is continuously pushed, and the power cord is pressed. In the closed structure, the second resilient arm is returned to the first elastic arm by the elastic force.

When the sockets are full, one can pull the plug out of the socket and rest on the power plug retainer. It will not touch the ground or spread on the table.

4. Conclusion

A power plug retainer is designed in this paper to solve the technical problem that the unplugged plug accidentally touches the ground. If it occurs in the bathroom, the plug that falls on the ground is likely to be splashed with water and will pose a safety hazard during the use. Even if there is no water on the ground, the lifetime of the plug may still be affected by the connectors that touch the ground and collisional deformation.

The specific application is to fix the frequently used plugs of household appliances around the sockets. When the sockets are full, the plug is replaced, the replaced plug is placed on the power plug retainer, does not touch the ground, and is not at the risk of splashing water. Meanwhile, it avoids clutter and keeps tidy. Finally, the safety of the plug is guaranteed. The power plug retainer innovatively designed in this paper has obtained the national invention patent authorization, its
structure is simple, and its cost is low. Moreover, it has strong practicability and has broad market prospects.

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