A New Type of Safety Socket Design

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Abstract. This paper points out the problems existing in the existing technology of socket, we design a new type of security socket, this paper introduces the basic structure of new type socket, illustrates the implementation process. Through reforming the socket internal structure, solve the problem of the plug the difficulties, eliminate the hidden trouble in security for socket, and improve security.

1. Introduction

Socket is an important basic industry product, has the extremely widespread application in the field of household and industrial. For plug socket, its extensive market and relatively simple basic structure, formed a huge domestic chain of production and processing enterprises, make China became the world's largest electrical accessories production, consumption and exporter.

At the same time, the socket involves the field of people's living and the national economic construction field, its security is related to thousands of daily life and industrial production order. Once these products have security issues, will be the direct cause of the harm such as fire accident. According to statistics, in 2006 the national fire in 235941, the electric fire 31380, accounting for 21.9% of the total number of fire, the fire reason first. The cause of electrical fire has many aspects, among them, the poor contact of plug socket is an indispensable factor of fire. Plug of safe and reliable performance [1], therefore, should get the attention of the whole society.

Therefore, it needs a safe and convenient to use socket. This design according to the current existing problems of socket, through reforming the socket internal structure, Make the plug convenient, easy operation, safe and reliable. When the plug goes into the socket, provide current safely. When the plug will be pulled up, quickly pop-up plug and cut off the current inside the socket, eliminate safety hidden trouble.

2. The Problems Exist In the Existing Technical Socket

There is various existing technology in the power socket, but the power socket exist the following problems and potential safety hazard [2].

1. After some plugs go into sockets, it's easy to have a loose and easy to produce electric spark [3], there is a lot of potential safety hazard.

2. Some plugs, as a result of the internal elastic sheet metal to the plug column has a strong compression effect, make the plug is very arduous when the plug is pulled out the socket .At the same time, it is bad for the plug.

3. After some plugs are pulled up, the electric current inside the socket is not cut off, and it is easy to get an electric shock [4].

4. Some poor contact sockets, not only can't reliably power supply, also are easy to cause electrical fires.

3. This Socket's Internal Structure

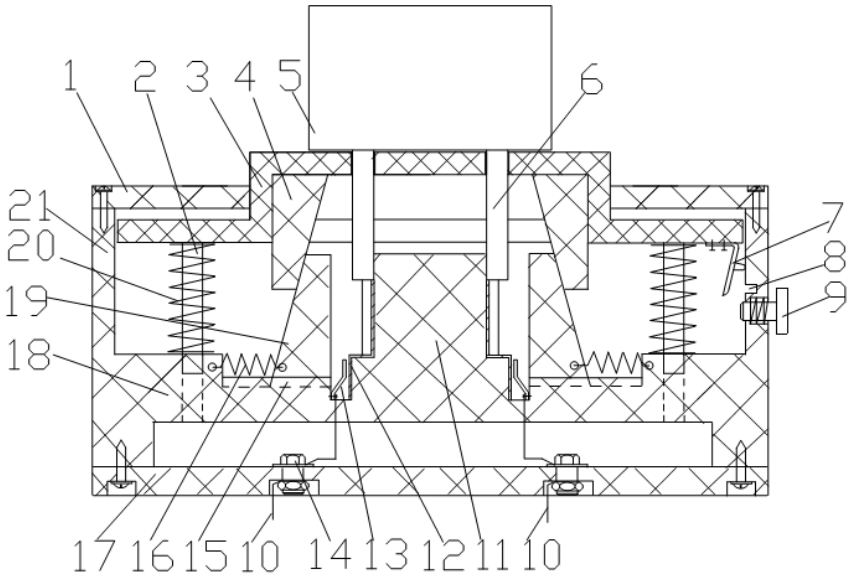

Fig. 1 The basic structure of socket

Symbols represented as in Fig. 1: 1 cover, 2 guide pin, 3 gland, 4 the upper wedge, 5 plug, 6 plug column, 7 elastic hook, 8 hook slot, 9 release button, 10 the power cord, 11 vertical plate, 12 conducting strip, 13 spring piece, 14 bolt, 15 the rail with the groove, 16 tension spring, 17 lower cover, 18 the middle frame plate, 19 the under wedge, 20 compression spring, 21 box body.

Structure connection details: The middle frame plate has two symmetrical sliding wedges. The upper wedges and the under wedges contact through the cant, and the middle frame board between the wedges is equipped with plug to plug column vertical plate. The vertical plate surfaces have some conductive slices. Between the wedge and vertical plate respectively is equipped with spring, and spring leaf through wires is connected to the charged bolt at the bottom of the socket. Elastic hook is on the gland, the box body side wall is equipped with the hook with elastic link adaptation groove, and this is the release button on the box body wall.

4. Implementation Process

When the plug goes in the socket, the plug will squeeze the gland. Under the action of forces the two upper wedges will move down with the plug. Through the upper wedges and the under wedges touch each other, the upper symmetric wedges will press the under symmetric wedges, and make two wedges press the charged spring piece, so the plug is connected with power supply. Elastic hook goes into the hook groove at the same time, to keep the stability of the plug contact state.

When press the release button, the pressure spring will bounce, and the plug will pop up quickly. The upper and under wedges will be separated at the same time. The under wedges under the action of tension spring will move to each side, and both sides of the leaf spring will reset. The electric current does not pass through the conductive pieces on the both sides of the vertical plate, so as to cut off the electric current in the socket [5].

5. Test of this Socket

Has now developed on completion of the new security socket, and carried on the test.

5.1 Test results are as follows:

1. The pop-up reliability test: 100 pop-up experiment was carried out, including reliable pop-up number for 98 times, reliable pop up at a rate of 98%;Reliable power supply for 100 times, reliable power supply at a rate of 100%.

2. The security test: in the experiments above does not appear when the plug with the

phenomenon of electric spark. At the same time we inserted the test pencil into the plug socket after the pop-up, but did not detect the current.

5.2 The results of analysis:

Reliability analysis: Due to the pop-up experiment for 100 times, it causes certain influence to the elasticity of the spring, thus resulting in the experimental process 2 times did not pop up. Reliable pop-up rate by 98% and 100% of the rate of reliable power supply, the new security socket is reliable.

Safety analysis: Because we do not see the phenomenon of electric spark and the electric current can be cut off when the plug is pulled up, the new security socket is safe.

6. Conclusion

This new security socket provides a reasonable internal structure design, solves the problem of the plug in the socket difficulties and the safe hidden trouble. Under the condition of without changing the existing electricity usage, achieve the safe and reliable power supply [6].

This new security socket design is reasonable, safe and reliable, easy to use, which eliminates the plug socket heavily poor contact, and the safety problems. When the plug is pulled up, can cut off the current inside the socket, and prevent to get an electric shock. This new security socket is safe and reliable and has certain social benefit and promotion value.

Safety issues should not be ignored in everyday life. Especially the electricity safety, it should cause our attention. The safety socket has solved the problems existing in the existing technology of socket, and that conforms to the development trend of security appliances. In the future, we can also come up with more ideas to adapt to the need of people's lives in the future. I believe that our future will be more beautiful in our efforts.

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