

# EASY BULB FIXING AND REMOVING EQUIPMENT

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**Abstract**—We develop an equipment to fix and remove the house hold electric bulb from its holder at different heights. To approach the bulbs at various heights, two tubes with different radius are connected using a threaded feature and a clamp is attached at the top of inner tube. Simple threading is made on external surface of the inner tube and internal thread is made on the inner tube. The two tubes are threaded with same pitch. To meet the bulbs at different heights, the height of the equipment is adjusted by simply twisting. The clamp contains a simple spring loaded with grips made up of polymer material. Also a small rubber sheet is fixed at the inner face of the clamp to have a smooth clamping of bulb and to remove the clamp from the holder after fixing the bulb.

**Keywords**—Bulb Fixing and Removing Equipment; Compression Spring; Threaded Height Adjustment

## 1. INTRODUCTION

Incandescent light bulb, compact fluorescent light (CFL) bulb and light-emitting diode (LED) are the present prominently used light sources. Usually, the holders of these bulbs are placed near the ceiling of the room and this requires lot of energy and sometimes leads to the minor accidents while fix or remove the bulb in holder. We develop an equipment to easily fix and remove the bulb in holder from the floor. There are few patents for instruments to remove and fit the electric bulb. R.C. Robinson in 1953, C.H. Fuller in 1956, Mitrowski in 1999, Barron in 2001 [1-4]. These instruments which have been patented already are suitable for incandescent bulbs and not for compact fluorescent lamp(CFL) bulbs. The equipment we develop is convenient for any types of household bulbs. The paper is organized as follows: The geometry of the equipment is given in Section II, the working mechanism is explained in section III and the summary is given in section IV.

## 2. GEOMETRICAL CONFIGURATIONS

The schematic picture of the proposed equipment designed by the software 'SOLIDWORKS' is shown in Figure 1. The basic parts of the equipment's are handle, coupling, clamp handle and clamp holder. The handle, clamp handle, clamp holder and clamp are made up of Polyvinyl Chloride (PVC) to make the equipment weightless and to avoid electric shock. The clamp handle is threaded outside and connected to the handle through an internally threaded coupling(see Figure 2) made of mild steel. The clamp holder is shown in Figure 3. It contains spring and clamp. The two curved hands of the clamp are pushed towards each other by the pair of springs. The inner side of the hands of the clamp is layered by rubber for better grip while holding the holder. In the present equipment we are using compression springs which are open-coil helical compression springs wound or constructed to oppose compression along the axis of wind.

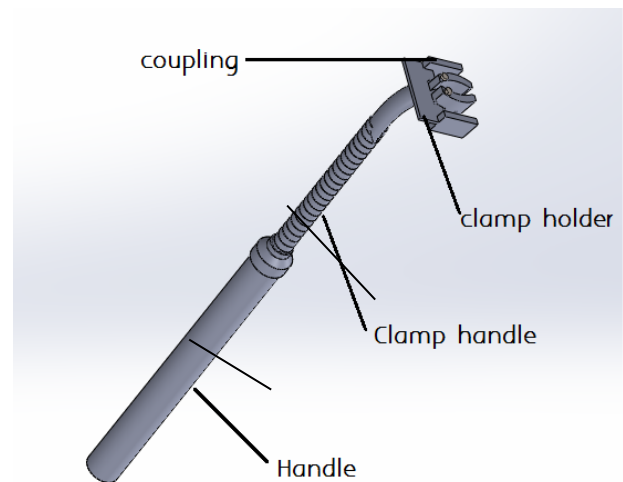


Figure 1: The picture of the equipment designed by SOLIDWORKS.



Figure 2: Picture of Coupling

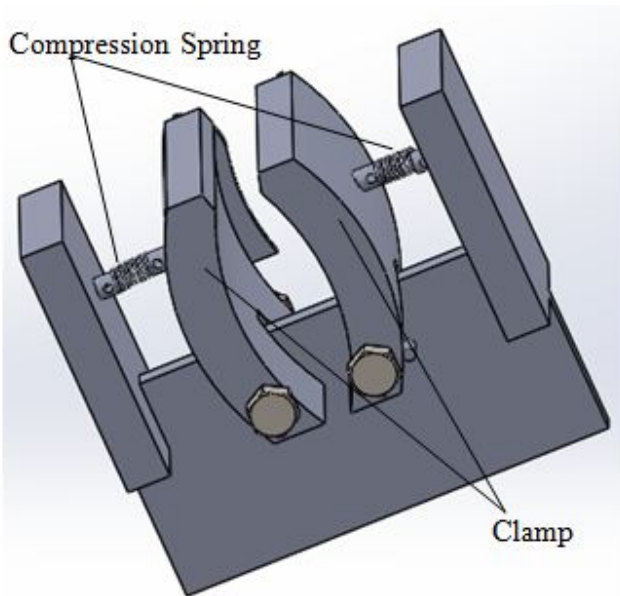


Figure 3: The picture Clamp Holder.

The spring is made of hardened steel, shown in Figure 4. The material parameters of the spring are given as follows: The diameter of the spring wire is 2 mm, the mean diameter of the spring coil is 8 mm, spring index is 4, pitch of the spring is 3.4 mm, the torque due to axial load is 480 N mm, shear stress of the spring is 305.57 N/mm<sup>2</sup>, normal stress of the spring is 6.36 N/mm<sup>2</sup> correction for the shear stress is 1.127, deflection of the spring is 0.9 cm and stiffness of the spring is 2.22 N/mm.



Figure 4: Helical compression spring

### 3. MECHANISM

To approach the bulb holders placed at different heights the clamp handle is twisted. Due to the threading, the coupling moves the clamp handle up or down depending on the direction of twist. After adjusting the height, the clamp holder is pushed toward the bulb holder. When the clamp holder is pressed against the bulb holder the two curved hands of the clamp open and let the bulb holder inside. Once the bulb holder comes inside the two hands of the clamp the clamp is locked automatically by compression spring and holds the bulb holder tightly. Then by rotating the handle in suitable direction we can remove

the bulb easily. The bulb can also be fixed in the same way it is removed. This equipment can be used against any kind of household electric bulbs.

### 4. SUMMARY

In the present paper, authors propose an equipment to fit and remove the electric bulbs easily from holders. They connect two PVC pipes, handle and clamp handle, through inner threaded coupling. The height of the equipment can be adjusted by twisting the outer threaded clamp handle. The helical compression string allows the clamp to hold the bulb tightly. This equipment is suitable for all kind of household electric bulbs.

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