

### SAFETY DEVICE FOR CEILING FAN

#### IITM Technology Available for Licensing

#### Problem Statement

- ❑ Conventional ceiling fan coupling arrangements easily support the weight of an average person during hanging., **posing a serious risk for self-harm and suicide**
- ❑ This vulnerability highlights a critical safety concern, necessitating the development of reliable safety device that effectively addresses the risk of hanging from ceiling fans, ensuring enhanced security and prevention measures.

#### Technology Category/ Market

##### Category – Assistive Devices/ Security Devices

**Applications** – Safety and Security devices, Home Appliances, Ceiling fans, Assistive devices

**Industry** – Safety and Security/ Consumer Technology

**Market** -The global security appliances market was valued at \$69.18 billion in 2020 and is projected to reach \$229.74 billion by 2030, growing at a CAGR of 12.81% from 2021 to 2030.

#### Key Features / Value Proposition

##### Technical Perspective

- ❑ The said safety device **prevents overload of a suspension arrangement of a ceiling fan**
- ❑ The arrangement of slits and the flare is configured such that the flare elastically deforms to release the bottom mount tube from the top mount tube.
- ❑ After the device releases due to application of a load above the threshold value, **it is easy to reassemble to restore the safety coupling.**

##### User Perspective

- ❑ The said safety device provides means for **safe coupling of a ceiling fan without the need for complex and expensive arrangements such as springs.**
- ❑ The release arrangement **is also highly reliable because of its simplicity, and inexpensive**
- ❑ The safety wire prevents accidents due to falling of the fan.

#### Technology

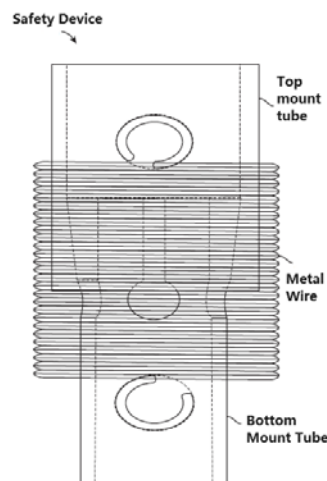
The present invention discloses a **safety device to prevent overload of a suspension arrangement of a ceiling fan, main components are:**

**Top Mount Tube:**having a diametrical hole near a top portion and a tapered bottom portion

**Bottom Mount Tube** -Having a Flared Portion at the top of the bottom mount tube and formed by a series of slits

**Overload Protection Mechanism:** slit closure on excess load and disengagement of suspension arrangement

- While installing, the top mount tube is attached securely to the ceiling using a bolt through the said diametrical hole
- The **bottom mount tube is configured to be placed within the top mount tube**, a top portion of the bottom mount tube having a plurality of **slits forming a flared portion**



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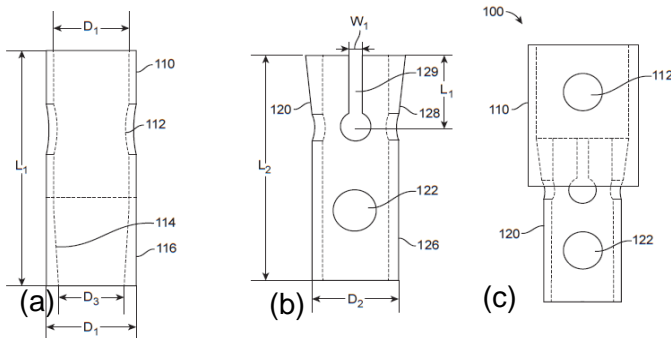
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### Industrial Consultancy & Sponsored Research (IC&SR)

- The said **series of slits engages with the tapered portion** of the top mount tube for a secure fit
- These **slits allow for controlled deformation of the tube under excessive load conditions**
- Upon application of a load above a threshold value, **the slits are configured to close and allow the bottom mount tube to pass through the bottom portion of the top mount tube, thereby disengaging the suspension arrangement.**
- The **threshold value** above which the slits are configured to close is **25kg.**
- The top mount tube and bottom mount tube are further connected using a metal wire which prevents the ceiling fan from falling after the suspension arrangement disengages.

#### Images

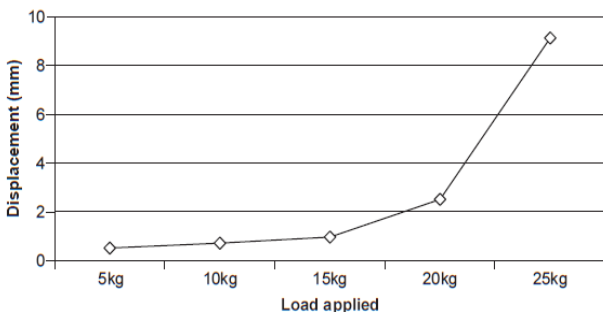


**Fig. 2(a)** illustrates a top mount design of a safety device for ceiling fans.

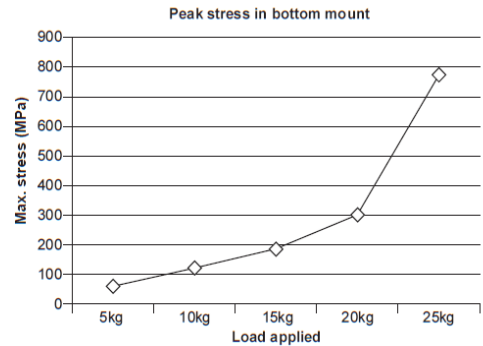
**Fig. 2(b)** illustrates bottom mount design of a safety device for ceiling fans.

**Fig. 2(c)** illustrates the connection between top and bottom mount tube of safety

Displacement of bottom mount



**Fig.3** shows graphically the displacement of bottom mount tube for varying loads.



**Fig. 4** shows graphically the stress variation in bottom mount tube for varying loads.

The peak stress near slit at bottom mount tube for loads ranging between 5 to 25kg. The increase in load increases the peak stress values where the rate of increase in stress values was high for loads ranging between 20kg to 25kg. The possibility of failure of the bottom mount tube increases, as the load increases beyond 20 kg

The property of the mild steel grade used in the safety device model is given in the table below:

Table 1: Properties of Mild Steel

Young's Modulus(E)	$2.1 \times 10^5 \text{ N/mm}^2$
Poisson's ratio	0.3
Yield strength	$250 \text{ N/mm}^2$
Density	$7890 \text{ kg/m}^3$

#### Intellectual Property

- IITM IDF Ref. 1626
- IN201841008565

#### TRL (Technology Readiness Level)

TRL-4/5, Technology Validated in Relevant Environment

#### Research Lab

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