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DEPARTMENT OF MECHANICAL ENGINEERING



PROJECT STAGE-II REPORT
ON

**“DESIGN AND MANUFACTURING OF MECHANISM FOR EMERGENCY EXIT
IN BUILDING”**

**UNDER THE GUIDANCE OF
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ABSRTACT

In this report the design and fabrication of mechanism for emergency exit in building is introduced. For escaping in high rise building is very important in case of fire, terrorist attack accident or any other cases. This machine is intended to provide an evacuee with an alternative evacuation route that is only to be used as a last resort during emergency situations. If the primary routes of exit are unavailable overwhelmed or obstructed in any way. There is a better way than waiting to be rescued. Experiment of this prototype machine shows that this equipment can release escape the person in time and bring evacuee more safety and escape efficiency. This machine is developed to provide the user and serve ability into the building evacuation system when the stairs and elevators are not possible or damaged. It gives the individual a chance to make their escape from a building in the critical minutes before rescue services arrived. The machine which we have designed here is suitable for any age group or any weight. This prototype is designed for 100 kg load, the machine is equipped with unique governor mechanism for downfall speed control and speed can be adjusted instantly. The machine is reusable again and again, any quantity of evacuee can escape through this machine. Experiments of its prototype in results, shows that this equipment can release evacuee on time with safety.

INTRODUCTION

Safe escape in the fire disaster of high-rise buildings is a world-wide unsolved problem because of the complicated structure of the building and the huge amounts of resident. Fires can cause devastating harm to property and even death to many people. The risk of being injured in a fire or becoming a fire casualty is higher for people with mental, physical and sensory disabilities. The excellent news is that deaths by fires are preventable provided that the person is educated on how to escape from a fire and equipped with devices like a fire alarm and a escape route. Everyone has a diminished capacity to react in a fire emergency so everyone needs to be careful. This mechanism is a unique personal rescue device which uses an individual harness to help a user safely escape from an emergency situation in a multi-story building for many users. The device for escaping in high-rise building become important for collective escape, which is easy to use and runs at high speed without extra power. Experiments of its prototype will show that this equipment can release escape person in time, and bring evacuee more safety and escape efficiency. This mechanism is a unique personal rescue device which uses an individual harness to help a user safely escape from an emergency situation in a multi-story building. As such, there are certain personal considerations that must be taken into account before this device is issued. The high-rise fire will suffer more loss because of the huge amounts of staff and equipment's. In common situation, it is difficult for the stair to escape safely because of many disadvantages in the normal escape entrance, such as, long evacuation line, long waiting time and low efficiency. As for this, a simple, fast and effective collective escape equipment will be the necessity of solving the escape problems in high-rise building. Fires can cause devastating harm to property and even death to many people. The risk of being injured in a fire or becoming a fire casualty is higher for people with mental, physical and sensory disabilities. The excellent news is that deaths by fires are preventable provided that the person is educated on how to escape from a fire and equipped with devices like a fire alarm and this mechanism.

1.1 Problem Statement

No proper device has been introduced yet which will safely land multiple peoples one by one on ground in case of emergency.

Challenge is to innovate such a device which has a huge market potential and also to develop a lifesaving kit.

During an earthquake, entrance and exit areas can easily be blocked by falling debris and elevators automatically shut down. Your only way out might be the window. You might have read that if you are indoors during an earthquake, your best bet would be to stay where you are and duck for cover. You might have read that you should hide under a desk. This would be true, assuming you don't have this device. You would run the risk of falling debris knocking you out cold as you're trying to navigate your way to the exit. There is a risk when you stay put, however, of the building collapsing, especially if it was built before stricter regulations which were implemented in 1975. If you have this mechanism, all you need to do is grab it, strap in, and within a couple of minutes you'll be on the ground. After you reach the ground, unhook and run away from the building as quickly as possible.



Figure demonstration of prototype

1.2 Objectives of Project

- To develop a constant going down speed reusable device
- To develop a device which requires No advance training
- To make a Product which works mechanically without the need for any outside power
- To develop a low-cost device for multiple people

1.3 Scope

The weight putted on this machine goes at a moderate speed of 1 m/s which will not harm the person hanging on it and also take him down quickly. One single machine can save multiple lives in case of emergency.

Living in a high-rise building offers many benefits: beautiful and expansive views, a prime location right in the middle of the hustle and bustle of city life, a great sense of community, and often, a number of included amenities. However, there are also a few drawbacks to living in a big building in a big city, and perhaps the biggest disadvantage is the potential danger that high-rise residents face each day.

You might not realize it, but your life could be in danger in a matter of minutes should a disaster strike while you're at home or work in a high-rise. The very nature of high-rise buildings – housing individuals thousands of feet above the ground – presents an extreme risk during a fire.

According to the National Fire Protection Association, there are over 15,000 high rise fires per year in the United States alone. The majority of those fires break out on the lower floors of the buildings – the 6th story or below – leaving occupants above that point in extreme danger. Whether it's the thick, choking smoke wafting upward, the flames climbing their way up the structure, or just intense heat, there is no shortage of danger, and it's important to have a way out at a moment's notice. What are you to do if there's an accidental explosion on the floors underneath your unit, or some sort of terrorist attack? You could very easily find yourself stranded atop a 100-story building with nowhere to go. For citizens who live or work in high rise buildings, that feeling of being a sitting duck during a disaster is something you can avoid with the proper preparation. By investing in the appropriate lifesaving gear, you can take your safety into your own hands. Sometimes, firefighters don't arrive in time. Other times, there is no way for rescue personnel to get to the top floors of a burning building, even when they do get to the scene quickly. With the this personal rescue device, you can exit a burning building through the window and find yourself safely on the ground in a matter of seconds.

1.4 Methodology

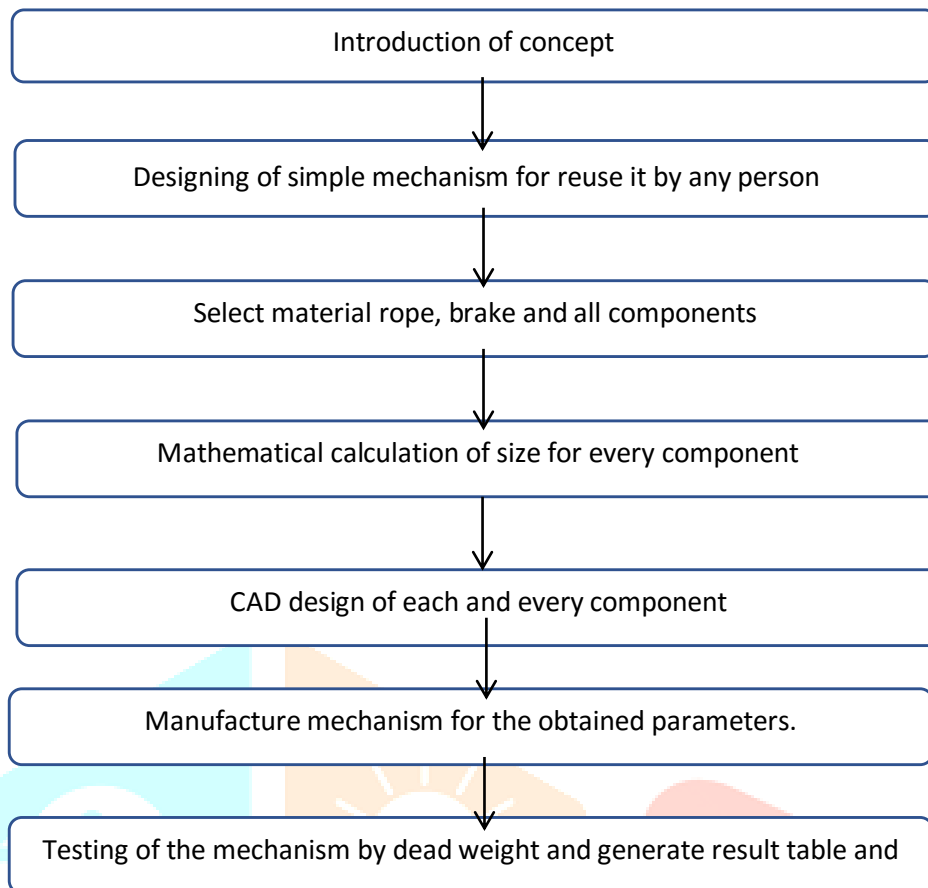


Figure Flowchart for Methodology

2. LITERATURE REVIEW

2.1 Research papers

1. Study on New Escape Chute Device of High-rise Building

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Methodology

Its storage box can release the chute pipe to position, cool the passage automatically. The material of flexible chute is fire-proof and smog-proof. In addition, the device can offer several people enter into the escape pipe at the same time. The experiments of prototype show that its mechanical structure and control system is reasonable and advanced. This escape equipment can be popularized and applied to the protection of high-rise building, especially to the rescue in emergency.

Conclusion

The major disadvantage of this device is it cannot be used in the direction of suppose you have installed it this device in East side and fire occurred in East side so you cannot escape through this but in this device we have improved it. it can be installed and taken to any direction opposite to the direction where there is no fire.

2. International Journal of Research and Scientific Innovation (IJRSI) | Volume III, Issue VI, June 2016 | ISSN 2321–2705

Sumit Kumar 1, Rajeev Kumar 2, Harish Kumar 3 Analysis & Investigation on Watt Governor to Improve the Speed Range of the Governor

Methodology

In the current investigation watt governor is modified such that it increases the controlling force .in modification the fly-ball is fixed on the lower arm at the small distance below from the point of intersection of arms. The analysis is carried out by mounting the flyball at the various positions on the lower arm.

Conclusion

Here in the paper the modification is made for increase the working range of the watt governor. And it is concluding that the working speed range can be enhanced by the modification discussed. From the example it is found that the speed range is increased from 66.89 - 77.24 rpm to 77.72 - 90.01 rpm by taking $c= 10$. Range can be enhanced by selecting the suitable value of c .

3. International Journal of Scientific and Research Publications, Volume 2, Issue 6, June 2012 1 ISSN 2250-3153 Design and Stress Analysis of Watt and Porter Governor Ravindra Singh Rana, Rajesh Purohit, Alok Singh

Methodology

The objective our investigation to identify the stress concentration areas, areas which are most susceptible to failure when governor is rotating about its axis, also the value of these stresses is measured. The displacement of the various elements of the SPINDLE from the base is also calculated and the graphs are plotted. Effect of the “WEIGHT OF THE ARMS” is the major area of concern for our study and all the calculations are done considering the weight of the arms.

Conclusion

In this paper, in our work, we have done the Stress analysis on a particular configuration of governor assembly and then various materials are suggested on a theoretical basis. the stress concentration areas, which are most susceptible to fail, so to avoid failure we have to increase the strength in those areas and to achieve this diameter of the shaft should be increased near the base.

4. OAK RIDGE ORNL/TM-2001/64 NATIONAL LABORATORY MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Compositions, Functions, and Testing of Friction Brake Materials and Their Additives

Peter J. Blau. August 200 1 Prepared for U.S. Department of Energy, Assistant Secretary

for Energy Efficiency and Renewable Energy, Office of Transportation Technologies.

Methodology

The purpose of this report is to present a survey of commercial brake materials and additives,

and to indicate their typical properties and functions, especially as regards their use in heavy

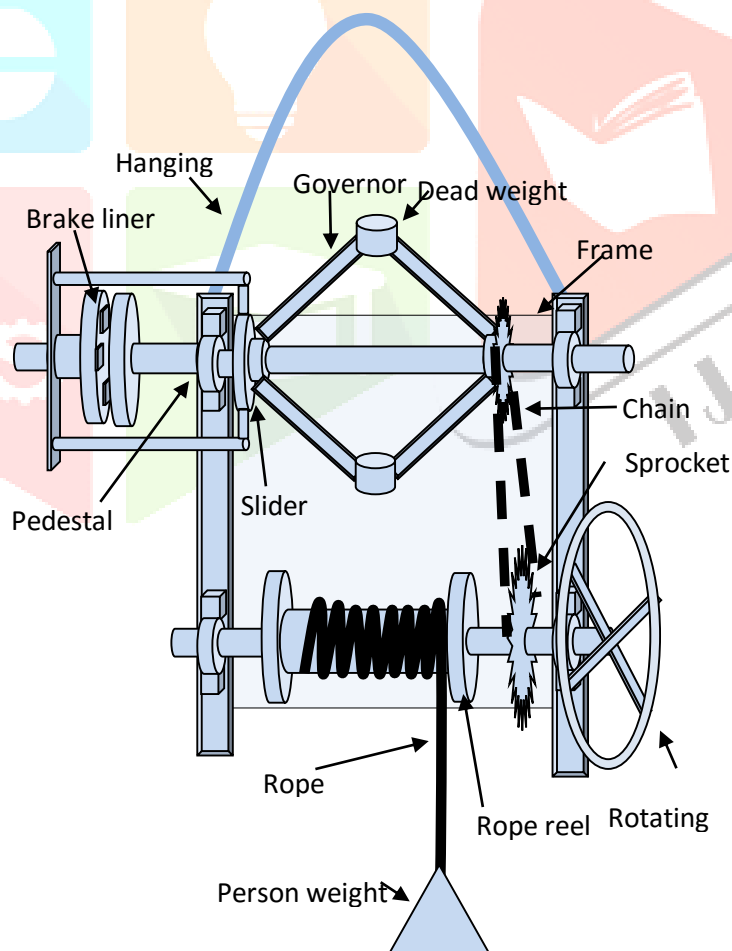
trucks. Most truck pad and shoe materials described here were designed to wear against cast iron. Brake material test methods are also briefly described. an attempt has been made to capture the primary constituents and their functions.

Conclusion

Sub-scale testing machines, other than inertial dynamometers have been designed for use in brake materials research. Such machines are usually custom-built, one-of-a-kind units. Depending on the focus of the research, they can be instrumented for torque (friction), temperature, and vibrational measurements. While not duplicating every aspect of on-vehicle braking, they can be used to study fundamental responses of materials to braking-like levels of energy input under carefully-controlled conditions. Phenomena like fade, thermo-elastic instability ('hot-spots'), pad wear, and friction-induced film formation can be studied using subscale testing machines.

3.2 Working methodology

- The personal wears a vest and attaches himself to the rope hook. As the personal jumps from the window and due to his weight, it pulls the rope with him and causes the reel to rotate.
- Reel is connected to governor shaft by belt and pulley
- As the speed increases the dead weight on porter governor tends to move outwards due to centrifugal force which applies the frictional brake and reduces the speed and this causes the personal to reach the ground from high level safely.
- The speed is limited by the breaks and this will cause the personal to descend at a safe.
- When the speed reduces the dead weight comes inside because reduction of the centrifugal force and this releases the brake.



6. CONCLUSION

6.1 Application

Can be used to escape from high tall buildings when there is danger of fire, earthquake disaster or any other reason.

1. Life of person will be saved.
2. Can be reused by multiple persons.
3. Save fire brigade person life too.
4. It is used in multi storey building to save life of persons when required.
5. It is also used in construction site for up-lifting the raw material.

6.2 Advantages

1. Life of person will be saved
2. Can be reused by multiple persons
3. Save fire brigade person life too

6.3 Limitations

1. One person at a time can go down
2. Time will be increased of building is much taller
3. If fire takes place at lower floor, then it is difficult to go down

6.4 Conclusion

The weight pulled on this machine goes at a moderate speed of 1 m/s which will not harm the person hanging on it and also take him down quickly. One single machine can save multiple lives in case of emergency. The developed prototype exhibits the expected results. Further modifications and working limitations will put this work in the main league of use. This concept saves time & energy which leads to efficient working. This further line should be modeled using equations and an experimental agreement. The product will act as a pioneer in firefighting systems.

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