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Design, Development & Manufacturing of Emergency Evacuation System

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Abstract – In present work, "Design, Development & Manufacturing of Emergency Evacuation System" 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 Roots 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.

Index Terms—About four key words or phrases in alphabetical order, separated by commas.

1. 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 Emergency Evacuation System. Everyone has a diminished capacity to react in a fire emergency so everyone needs to be careful. Emergency Evacuation System 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 Emergency Evacuation System devices 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 shows that this equipment can release escape person in time, and bring evacuee more safety and escape efficiency. Emergency Evacuation System 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 a Emergency Evacuation System 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 a Emergency Evacuation System

2. LITERATURE REVIEW

Research Paper 1 –
Title: Design and Stress Analysis of Watt and Porter Governor, International Journal of Scientific and Research Publications(IJSRP)
Authors: Ravindra Singh Rana, Rajesh Purohit, Alok Singh

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

In This Paper, In Our Work, They 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.

Research Paper 2 –
Title: Study on New Escape Chute Device of High-rise Building (2012), Advanced Materials Research, Trans Tech Publications, Switzerland

Authors: Yao Yansheng

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.

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 Emergency Evacuation System We Have Improved It Can Be Installed And Taken To Any Direction Opposite To The Direction Where There Is No Fire.

Research Paper 3 –
Title: FIRE ESCAPE APPARATUS FOR USE IN HIGH-RISE BUILDINGS AND THE LIKE
Authors: Orey C. Orgeron, 706 Souvenir Gate, Lafayette

A personnel escape mechanism for emergency evacuation of a high-rise building. An escape support for personnel in the form of harnesses or a protective cage is suspended from a trolley, riding on a rail extending externally from the building. The escape support is suspended by cable from a constant speed rotationally braked cable payout mechanism mounted in the trolley. The support and trolley are impelled to the outside of the building through a frangible wall opening, and then lowered to a safe ground location by the braked cable pay-out mechanism. In a preferred embodiment of the invention, a steel cage is provided on wheels near window of safety glass. This cage is suspended from a cable wound on a cable drum, which is rotationally coupled. to a hydraulic pump controlled by a restricted, closed loop flow path. The cable drum and pump are mounted in a trolley which rides on an I-beam projecting out of the building through the safety glass.

Research Paper 4 –
Title: Analysis & Investigation on Watt Governor to Improve the Speed Range of the Governor(2016)
Authors: Sumit Kumar1, Rajeev Kumar2, Harish Kumar3

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.

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.

Research Paper 5 –
Title: BUILDING EVACUATION SYSTEM
Authors: Anthony Talucci, 2045 Valley Drive, Syracuse, N.Y. 1320

A system for emergency evacuation of individuals from a multi-story building. A hollow, vertically disposed tube of sufficient cross section to accommodate a person in a sitting position is affixed to the outside of the building, parallel to a side wall, and inclined tubes provide access from a doorway through the building wall at each floor to the interior of the vertical tube. Pivotally mounted platforms are disposed within the tube at vertical intervals of a few feet and attached to weighted lever arms which normally maintain the platforms in a blocking position across the interior of the tube. The weight of an individual will overcome the bias of the counterweight and rotate the platform to an unblocking position, allowing the individual to drop to the next platform. A controlled rate of descent is provided by the time required for the individual's weight to over come the inertia and biasing force of the counterweights attached to the lever arms at each successively lower level. A number of optional features are also disclosed, including automatic adjustment of the biasing force on the platform in accordance with the weight of each individual, and safety indicators and interlocks.

Research Paper 6 –
Title: FIRE ALARM SYSTEM WITH METHOD OF BUILDING OCCUPANT EVACUATION
Authors: Robert Right, Bradenton Beach, FL (US); Hilario Costa, Myakka, FL (US)

A fire alarm system is provided including a controller having a signaling delay, a plurality of Smoke and/or heat detectors, a plurality of audible devices which may include sirens, public announcement devices and the like, and a plurality of visible devices which may include strobes, fluorescent lighting and the like. The system provides a directional path to areas of safety for occupants in harms way.

The foregoing needs are met, to a great extent, by the present invention, wherein in one aspect an apparatus is provided that in some embodiments provides a direct and timely path of egress in an emergency situation.
In accordance with one aspect of the present invention, a fire alarm system is provided, comprising a controller; a plurality of detectors; a plurality of audible devices: and a plurality of visible devices, wherein the controller is electrically connected to the detectors and controls the audible devices and the visible devices. The fire alarm system also includes the controller having memory and a delay control.
In accordance with another aspect of the present invention, a method of controlling a fire alarm system is provided comprising assigning an address to each of a plurality of detectors, audible devices and visible devices: storing said address of each detector, audible device and visible device; correlating each stored addresses to a physical location; activating a general alarm on each audible device and each visible device; determining activated detector's address and physical location; determining correlation of activated detector in proximity to each audible device and each visible device; assigning a sequence number to each audible device and each visible device; and activating each audible device and visible device according to their sequence number.

3.METHODOLOGY

- Introduction of concept
- Designing of simple mechanism for reuse it by any person
- Select material rope, brake and all components
- Mathematical calculation of size for every components
- CAD design of each and every component
- Manufacture for the obtained parameters.
- Testing by dead weight and generate result table and graph

A. Figures

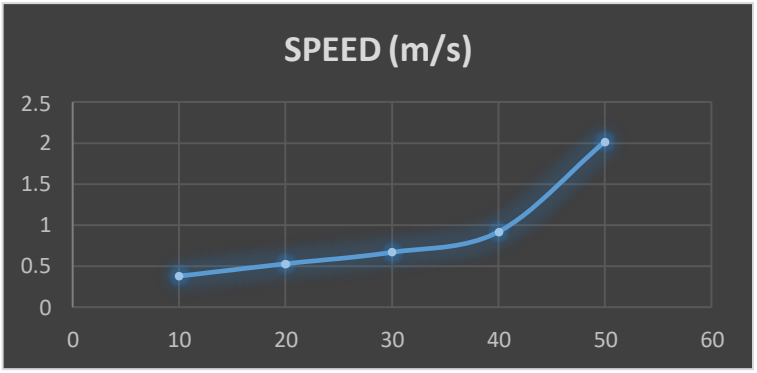
Fig. 1. Parabolic fin CFD analysis

4. MODEL SELECTION

The results and discussion may be combined into a common section or obtainable separately. They may also be broken into subsets with short, revealing captions. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. This section should be typed in character size 10pt Times New Roman.

Table 1. Comparison of displacement of all 5 cases

10	4.26	11.2	0.38
20	4.26	8	0.53
30	4.26	6.3	0.67
40	4.26	4.6	
50	4.26	2.1	



X- axis = weight (kg)
Y- axis = speed (m/s)

Figure 2: Weight VS Speed

5. CONCLUSIONS

1. The weight pulled on Emergency Evacuation System 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.

5.REFERENCES

[1] R. S. Khurmi, and J. K. Gupta. Theory of machines. S. Chand, 2001

[2] B. D. Shiwalkar "Design Data For Machine Element"

[3] DR. P Kannaiah 'Machine Design' SciTech publication (I) pvt ltd-2003

[4] R.S KHURMI "A text book of machine design" edition 2004

[5] N.D BHATT AND V.M PANCHAL "Machine Drawing" Charotar publishing house 24th edition.

[6] PANDYA AND SHAH "Machine design" Charotar publishing house 13th edition.