REGENERATIVE ELEVATOR WITH BACKUP PLAN

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Abstract - *The need of technology for increasing luxury in lifestyle is growing at very fast rate. The elevators, used to avoid climbing the stairs is growing demand world-wide. But some multi-storeyed building can't afford generator or battery charged by external source. This problem can be avoided by using Rack & Pinion arrangement in elevator that can charge the battery to avoid the problem faced during electricity cut-off. This system is used to make elevator regenerative for backup. The pinion arrangement is done on the cage and Rack is attached vertically on height of the wall.*

Key Words: Regenerative, Elevator, backup, plan, evacuate.

1. INTRODUCTION

This emergency elevator system is designed to evacuate people during an emergency conditions from a high-rise building. This system can facilitate emergency entry of rescue workers as well as exit of people from a building during emergency condition and at the same time using only the passenger's weight in the absence of electric power.
This elevator system will help people to escape from a disaster-affected building while transporting rescue team to the disturbed floors in a building at the same time – as efficiently, safely and quickly as possible.

1.1 AIM AND OBJECTIVE

- To design the new system which can operate when the electricity is off.
- No conventional fuel use like petrol, diesel, gas etc……..
- Eco friendly
- Handling must be easy
- It is having Higher efficiency
- Easy to conveyance
- Works at emergency conditions

1.2 WORKING PRINCIPLE

The complete diagram of the power generation using Rack and Pinion arrangement is given below. This system can facilitate emergency entry of rescue workers as well as exit of people from the building in emergency conditions and at the same time while using only the weight of the passengers in the absence of electric power. The body of elevator is connected with the rack, whenever elevator move up and down, rack moves up and down in vertical direction. Pinion is connected with the rack and reciprocating motion of rack is converted to rotary motion by help of pinion. This rotary movement is converted to the electrical energy by Generator shaft.

BLOCK DIAGRAM

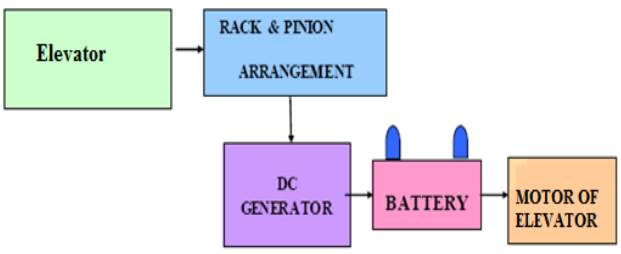

Fig -1: Block Diagram

The generator is used here, is permanent magnet D.C generator. The voltage generated is about 12Volt D.C. The Lead-acid 12 Volt battery is used to store this D.C voltage. The battery is connected to the motor with switch and switch connection is given in to the lift. Passengers inside can use a two way switch for up and down motion of the elevator.

2. HISTORY

An elevator is a transport device used to move goods or people vertically. In British English and other English, elevators are more commonly known as lifts, although the word elevator is familiar from American movies and television shows.

2.1 History of Elevator

Elevators began as simple rope or chain hoists. An elevator is essentially a mechanical means that either pulls or pushes a platform. A modern day elevator consists of a cab (also called a "cage" or "car") mounted by means of a shaft or more correctly a hoist way. In the past, steam and water hydraulic pistons were used to power the elevator drive mechanisms.

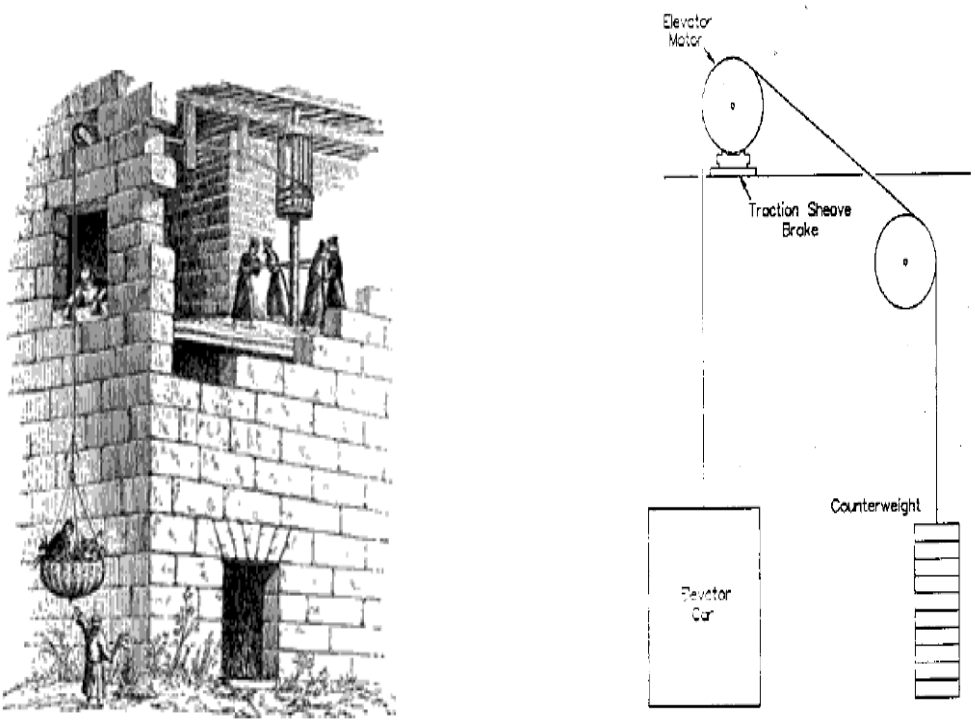

Fig -2: Ancient Elevators

During the middle ages, the elevators were operated by means animal and human power or by water-driven mechanisms. The elevator as we know it today was first developed during the 1800s and depend on hydraulic or steam plungers for lifting capability. In the latter application, the cab was attached to a hollow plunger which lowered into an underground cylinder. Liquid, most commonly, to create pressure water was injected into the cylinder and it makes the plunger to elevate the cab, which would simply lower by gravity as the water was removed. The water flow governing valves were manipulated by passengers using ropes running through the cab, a system later was enhanced with the integration of lever controls and pilot valves to regulate cab speed. The granddaddy of today's traction elevators were first arose during the 19th century in the United Kingdom, a lift running over a pulley using a rope and a counterweight travelling along the shaft wall.

In the 1800s, with the advent of electricity, the electric motor has been incorporated into elevator technology by German inventor Werner von Siemens. With the motor seated at the bottom of the cage, this design was then employed a gearing scheme to climb shaft walls fitted with racks. By 1903, the evolvement of this design into the gearless traction electric elevator, allowing hundred-plus story buildings to become feasible and permanently changing the landscape of urban. Multi-speed

motors replaced the original single-speed models to help with leveling, landing and overall smoother operation. Electromagnet technology replaced manual rope-driven switching and braking. Besides, controls with Push-button and various signal systems having complexities, modernized the elevator even further. Safety improvements have been recurrent, along with a notable development by Charles Otis.

Today, there are intricate governors and switching schemes to control cab speeds carefully in any situation. Buttons have been giving way to keypads. Virtually all commercial elevators are operated automatically as the computer age has brought the microchip-based capability to operate vast banks of elevators with actual programming, extreme safety and maximized efficiency. Elevators have become a medium of architectural term as fascinating as the buildings, in which they are installed, and new technologies and designs regularly allow the human spirit.

3. COMPONENTS AND THEIR SPECIFICATIONS

Some of major components are:

- MOTOR - 0.5HP with 50 RPM
- SHAFT - 20mm Diameter
- PINION - 50mm Diameter with 5 module
- RACK - 1000mm Length with 5 module
- ROPE - Steel wired

4. WORKING

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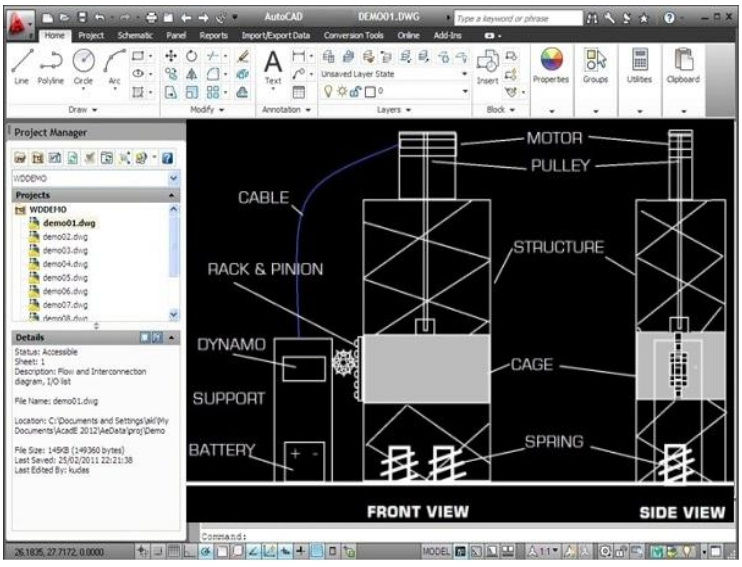

Fig -3: Auto-CAD model

3. CONCLUSIONS

During an emergency conditions, from a high-rise building to evacuate people this emergency elevator system is designed. This system can facilitate emergency entry of rescue workers as well as emergency exit of people from the building and at the same time while using only the weight of the passengers in the absence of electric power. This elevator system will help people escape from a disaster-stricken building while transporting rescue workers to the distracted floors of the building at the same time – as efficiently, safely and quickly as possible.

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