4/30/2021

GYANMANJARI INSTITUTE OF TECHNOLOGY

REPORT FOR EMERGENCY ESCAPE FORM MULTI STORAGE BUILDING

Gujarat Technological University | 2020-21

Chandkheda, Ahmedabad

Gyanmanjari Institute of Technology

Sidsar Road, Bhavnagar (Affiliated with GTU)

A User Defined Project Report on

"EMERGENCY ESCAPE DEVICE USE FOR MULTY STORAGE BUILDINGS"

Under subject of

PROJECT-II

B.E. IV, Semester - VIII

MECH Branch

Submitted By

TEAM ID:

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Head of the Dept.

Prof. Jay V. Bhatt Sir.
Faculty Guide

Academic Year: (2020-2021)

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Gyanmanjari Institute of Technology

Sidsar road, Bhavnagar (Affiliated with GTU)

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the dissertation entitled EMERGENCY EVACUATE SYSTEM FOR MULTI STORAGE BUILDING has been carried out by JANI JATIN (181293119004), PATEL AAKASH (181293119012), PATHAK JAYPAL (181293119013), TRIVEDI KARAN (181293119019), under my guidance in fulfillment of the degree of Bachelor of Engineering in MECHANICALENGINNERING (8th Semester) of Gujarat Technological University (GTU), Ahmadabad during the academic year 2020-21.

Internal Guide	HOD, Mechanical
Prof. Jay V. Bhatt	Prof. Krunal B. Khiraiya

Acknowledgement:

We wish to express our sincere gratitude to our project guide Prof. **JAY V. BHATT** and all the faculty members for helping us through our project by giving us the necessary suggestions and advices along with their valuable co-ordination in completing this work.

We also thank our parents, friends and all the members of the family for their precious support and encouragement which they had provided in completion of our work. In addition to that, we would also like to mention the college personals who gave us the permission to use and experience the valuable resources required for the project from the college premises.

Thus, In conclusion to the above said, we once again thank the faculties and members of **GYANMANJARI INSTITUTE OF TECHNOLOGY** for their valuable support in completion of the project.

Thank You

1. JANI JATIN R.
2. PATEL AKASH J.
3. PATHAK JAYPAL B.
4. TRIVEDI KARAN M.

Abstract:

The project is about an accident or emergency situation like fire and earthquake with safely evacuate in this situation the device is made and also to reduce damage during escape so, we ignore electrical escape device to reduce chance of fire hazards and build ergonomic design of product which base on hydraulic force and simple gravity, the system has main shaft/cylinder and mechanical screws, which are fabricated with plate to transmit and grip for center line, at the both end of screw the hydraulic press is attached to reduce speed of shaft or cylinder. When the cylinder rotates due to load sustained on it, the screw rotates and slides to the outward the cylinder, it mounts with the another plate which is attached with hydraulic press & the piston rod is pressed whose capacity is 150 kg it is pressed by screws, when the rod reach at end then cylinder will stop rotating and load is reached at ground level and load can be removed without damage.

Chapter 1: Introduction

1.1 Problem summary:

In the present scenario, present evacuation is not quick responsive so difficult to in advance is That condition change dynamically during emergencies such as fires on shootings, earthquake, in use this device . In order to maintain the expected capacity under the limitation of a building site (i.e. construction area or space), architects focus on increasing the height of the building, instead of its width and length. This Device Design and Development According To Use in Industrial Purpose. But we have design new leg massager which works on the mechanical principle.

1.2 Aim and objectives of the project:

Our aim is to provide emergency exits from building provide comfortable and easy to land in fire situation, the main objective of our project is focusing on fire and other emergency fire hazards situation and work in the field of safety and fire hazard to develop technological advance and sustainable product.

1.3 Problem specification:

Present evacuation is not quick responsive not ergonomically design emergency escapes exits from residency Emergency procedures must also be in place and practiced to ensure safe evacuation in the event of a fire. The principle on which means of escape provisions are based is that the time available for escape (an assessment of the length of time between the fire starting and it making the means of escape from the workplace unsafe) is greater than the time needed for escape (the length of time it will take everyone to evacuate once a fire has been discovered and warning given).

1.4 Plan of work

As we decided to create platform and build a system for emergency escape system first we research about problem of current system and existing system technology for solution. Sites in Google to build accurate system and innovate escape technology .By searching different patent and research paper.

Even with great research decided to develop self energy or hydraulic based system and remove the maximum chance of injury .in views of that the efficient use and responsible handling of resource becomes more important.

Here we go to through much research paper for energy drive mechanism and main cylinder. We made robust design addicting some features like suspension for reducing speed of cylinder.

Here we go through much research paper for adjusting the screw and suspension rod .we plan reverse drive for reset the device after the use of single time. In this seem we design and create on paper analysis on solid works for prototype.

We decided to manufacture design and accepted prototype model by suitable material and standard.

1.5 Tools Required

- Solid works
- Machines (lathe, drilling, etc)
- Fabrication tool
- Measurement instruments
- Welding set up

Chapter 2: Literature Review and Prior Art Search

2.1 BUILDING EVACUATION SYSTEM AND ASSOCIATED METHOD

Inventor: Yoram Curiel, 1956 S. Nome, Aurora, Colo. 80014

Appl. No.: 573,359, Filed: Jan. 24, 1984

Patent Number:4,531,611, Date of Patent: Jul. 30, 1985

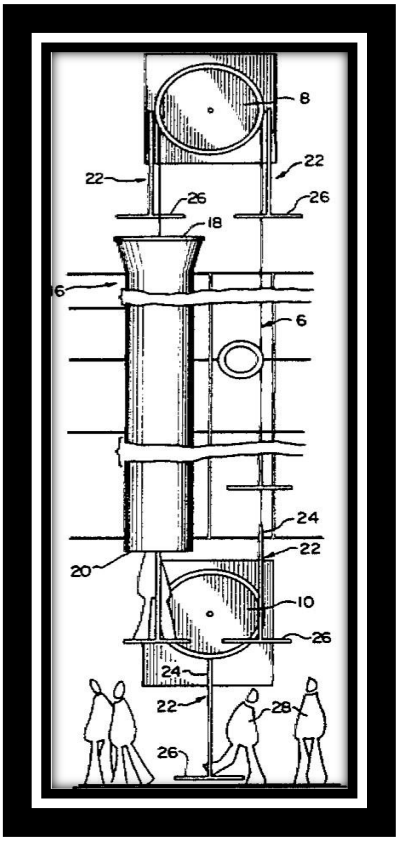


Figure 2.1

ABSTRACT: A building evacuation system includes an endless conveyor member having a plurality of platform members secured thereto and upper and lower support means for supporting the endless conveyor and permitting orbital movement thereof. An elongated tubular member through which the endless conveyor passes has at least one opening in the wall generally facing the building to permit evacuees to enter the tube and get onto a platform member or emergency personnel being delivered to said building to exit from the tubular member through the opening. The platform members preferably have a rod which is rotatably secured to the endless conveyor and a platform portion disposed at or adjacent the lower end of the rod.

2.2 INJECTION DEVICE

Applicant: SHAILY ENGINEERING PLASTICS LIMITED Application Number: 02147016279

Publication Number: 15/2021, Application Number: 202147016279,

Publication Date: 09/04/2021

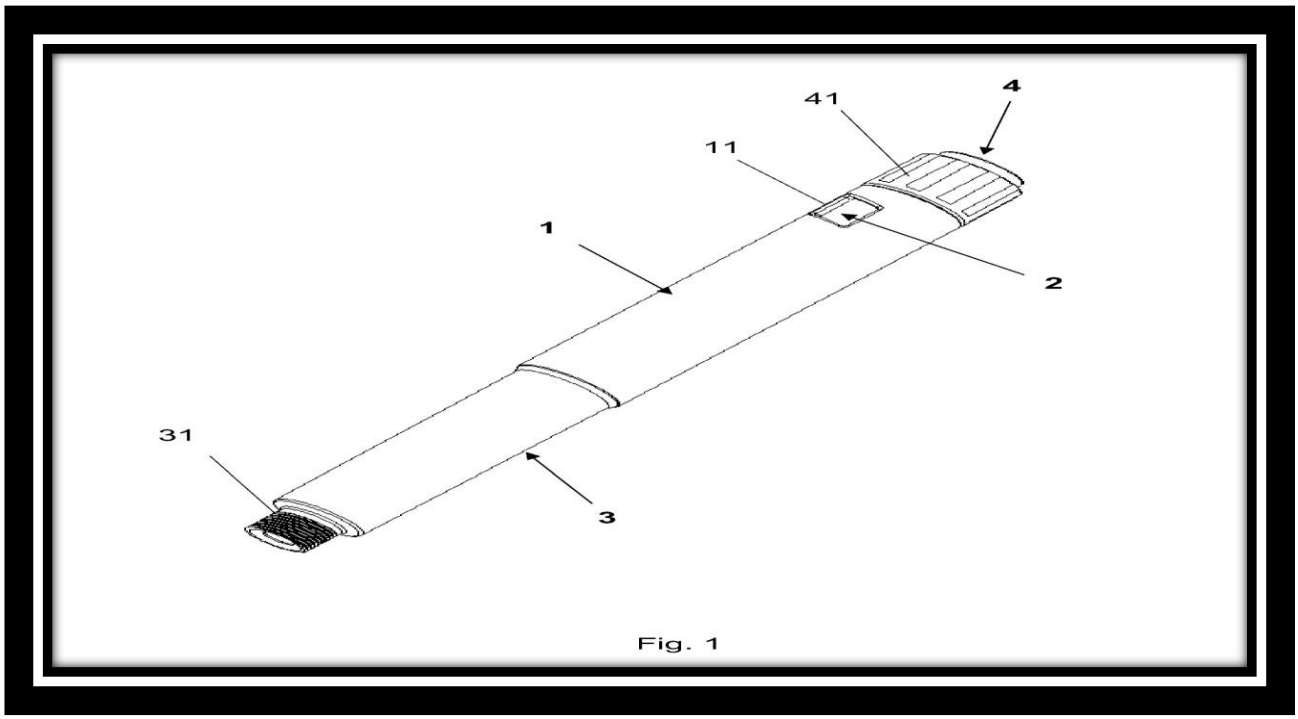


Figure 2.2

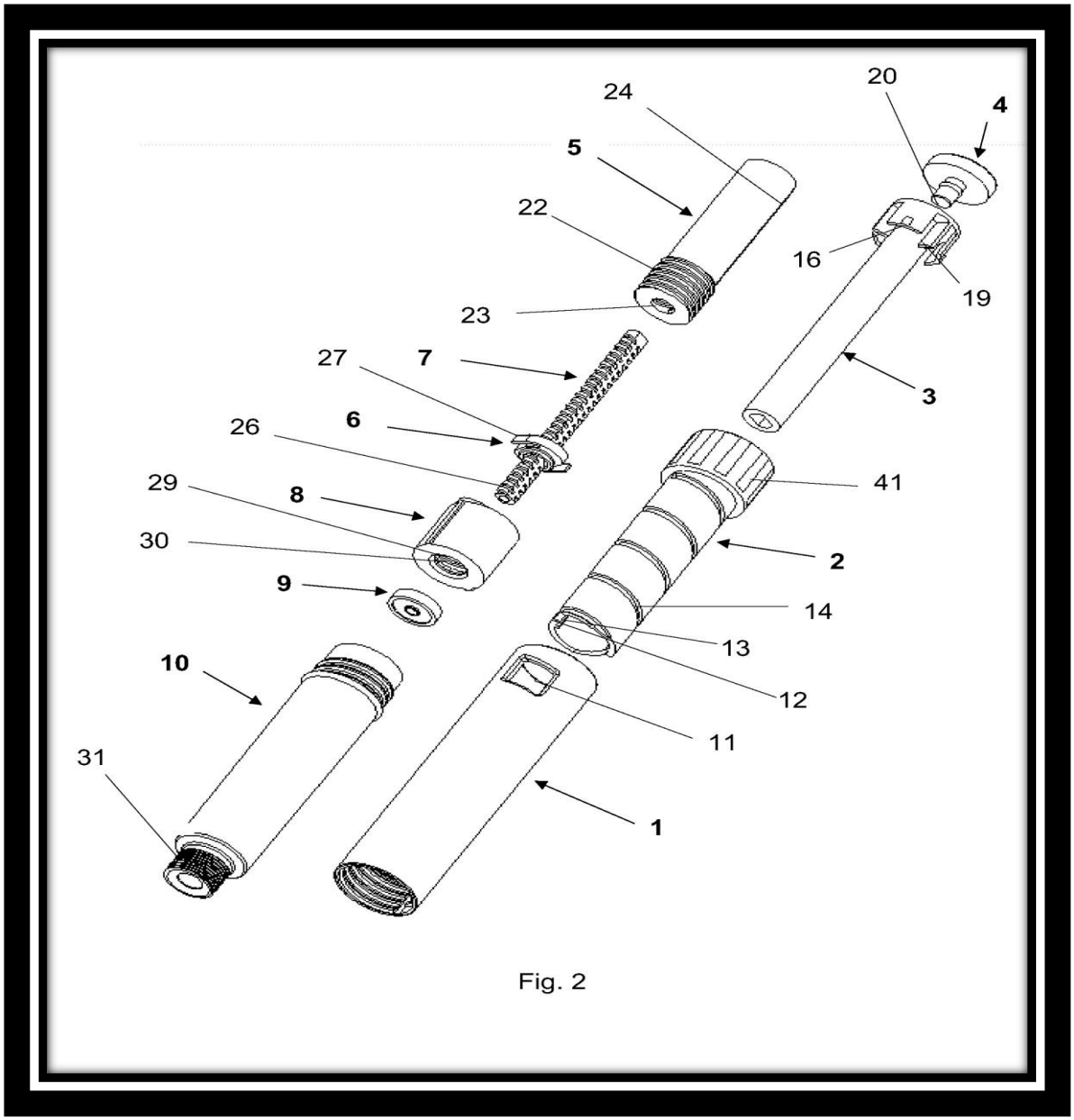


Figure 2.3

Abstract: An injection device is disclosed wherein a dose can be set by rotating a dose setting member, whereby a push button is elevated from one end of the device a distance proportional to the set dose from a position fixed relative to the housing, and wherein the set dose can then be injected by pressing the push button back to its non-elevated position, through which motion a screw will move approximately the same distance or a smaller distance. The invention provides a method of reducing the dose force and/or the push-button movement during injection.

2.3INTELLIGENT EVACUATION SYSTEM

Applicant: Lovely Professional University Inventor: Dr. Ashutosh Sharma, Dr. Sakshi Aneja

Application Number: 201911049332, Publication Date: 20/12/2019

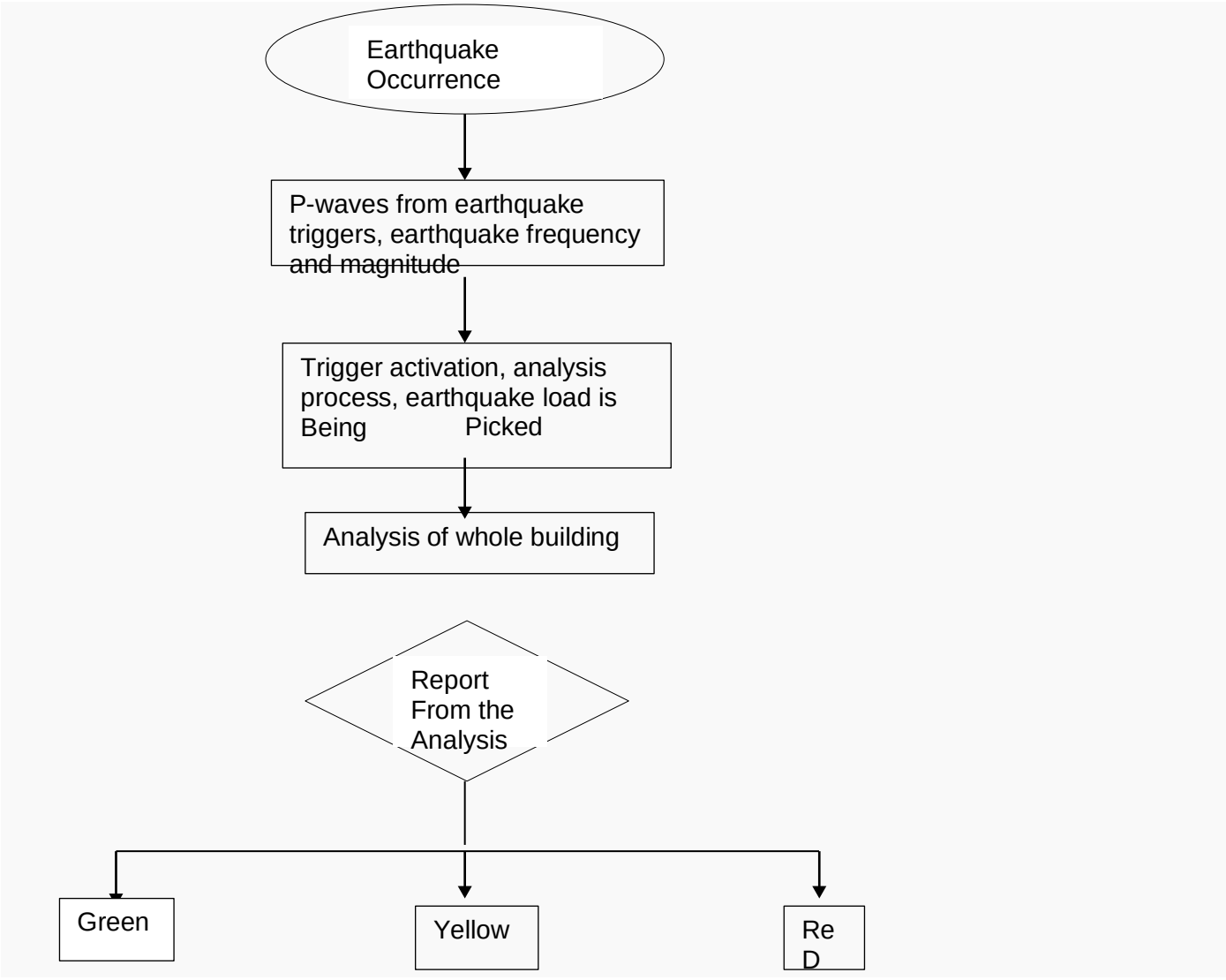
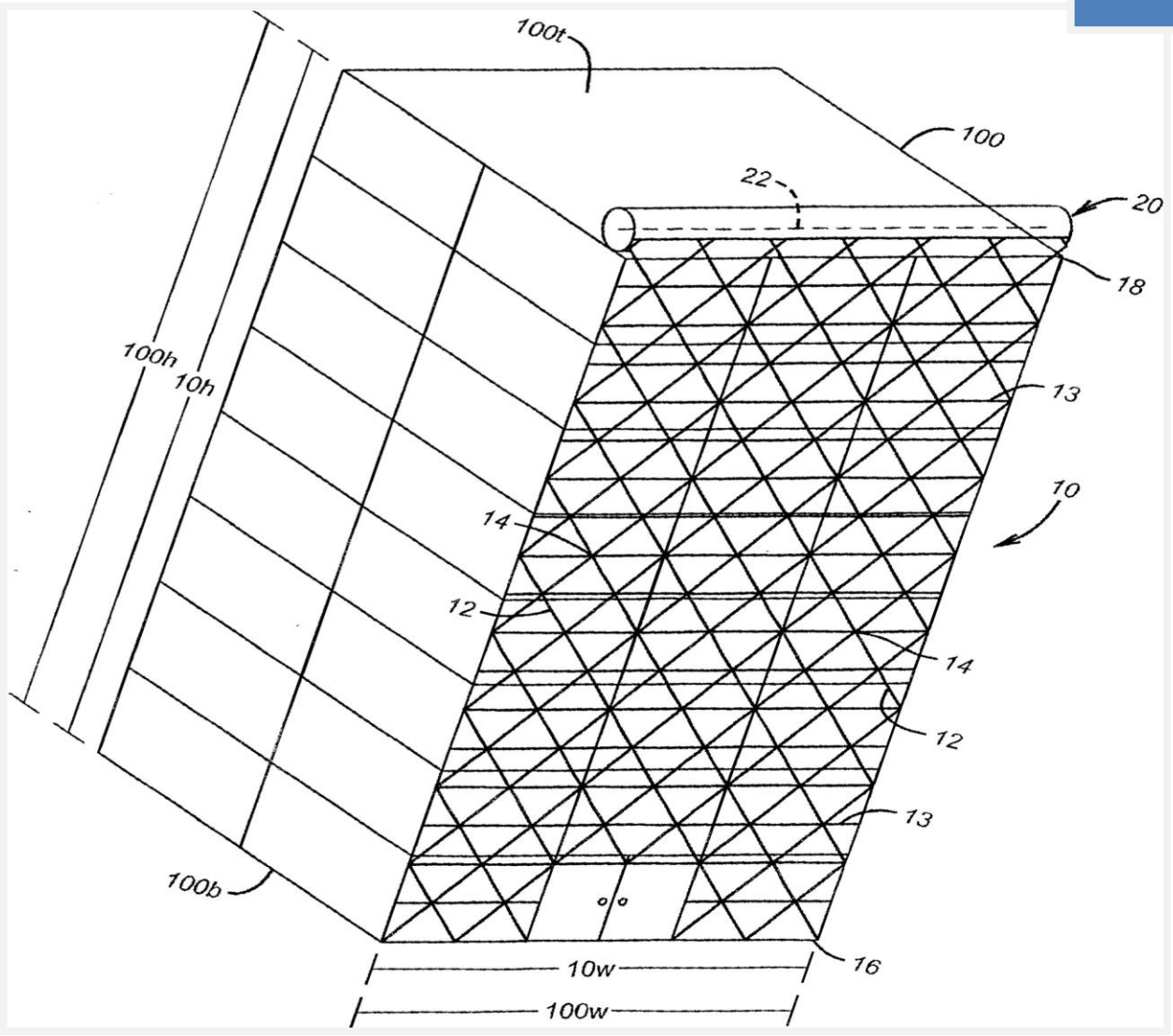


Fig. 2.4

2.4 FIRE ESCAPE NETTING

Inventor: John L. May, Beaumont, TX (US), Patent Application Publication (10) Pub. No.: US 2001/0045323 Al
Pub. Date: Nov. 29, 2001 Filed: May 21, 2001



Abstract: A fire escape mechanism that utilizes a web configuration of heat tolerant, low heat conductive, light weight, and high strength material that is extended along the height of a multi-story building such that individuals in the building an escape from a fire in the building by exiting the building directly onto the fire escape web and lower themselves to safety by climbing down its length.

Chapter 3: Material Selection

3.1 Material:

Material selection is a step in the process of designing any physical subject. In the context of product design, the main goal of material selection is to minimize cost while meeting performance goals. Systematic selection of the best material for a given application begins with properties and the cost of candidates materials. So, for getting the best material selection should be done by considering different types of properties like strength, +durability, weight, resistance to corrosion and heat, machinability, etc. Following table shows the comparison between different types of the material and its properties which should be best for our project for making different types of parts.

Material	Strength/ Toughness	Corrosion Resistance	Machinability	Advantages
Steels	Excellent	Poor	Good	Cheap cost. Magnetic wild variety. Different properties. High stiffness.
Mild steel	Good	Poor	Good	Tensile and impact strength is high. Not suitable for heat treatment.
Aluminum	Medium	Good	Poor	Light weight. Produces any type of shapes. Low Mfg. cost.

3.2 Material Characteristics

1) Aluminum

Corrosion resistance: good

Machinability: Good

Advantages: cheap cost, high stiffness less weight.

2) Steel

Corrosion resistance: poor

Machinability: poor

Advantages: cheap cost, high stiffness, magnetic wild variety, different properties.

3) Mild Steel

Corrosion resistance: poor

Machinability: poor

Advantages: Tensile and Impact strength is higher, Not suitable for heat treatment, suitable for mechanical or fabrication work.

3.3 Reason for selecting materials

For our mechanism, we require a material which should have high strength, good wear resistance, corrosion resistance, able to work on high temperature, works smoothly. Also, the friction material used between both cones should have high wear and tear resistance. It is not possible to manufacture the components using single material. So, to manufacture different parts must be made of using different types of alloys which are made of combining different types of materials like, Plastic aluminum, chromium s.s etc. using alloys for manufacturing fulfils all required properties and can give the best of working in all the condition and changes of failure are very less.

Chapter 4: Design Methodology

4.1 AEIOU Canvas

The canvas covers the overall lookout of the observations and notes taken by our team members

4.1.1 Introduction:

It is a useful tool to help and interpret observations obtained by ethnographic practices in the field. Also, it is an observation tool with two primary functions such as data coding and developing building blocks of model that ultimately address the objectives and issues of a client.

4.1.2 Relevance:

We know that AEIOU canvas depicts the summary of our project involving the people or objects which are subjected to use of our End factor. AEIOU canvas is necessary to understand the proposed theories which are maintained throughout the project.

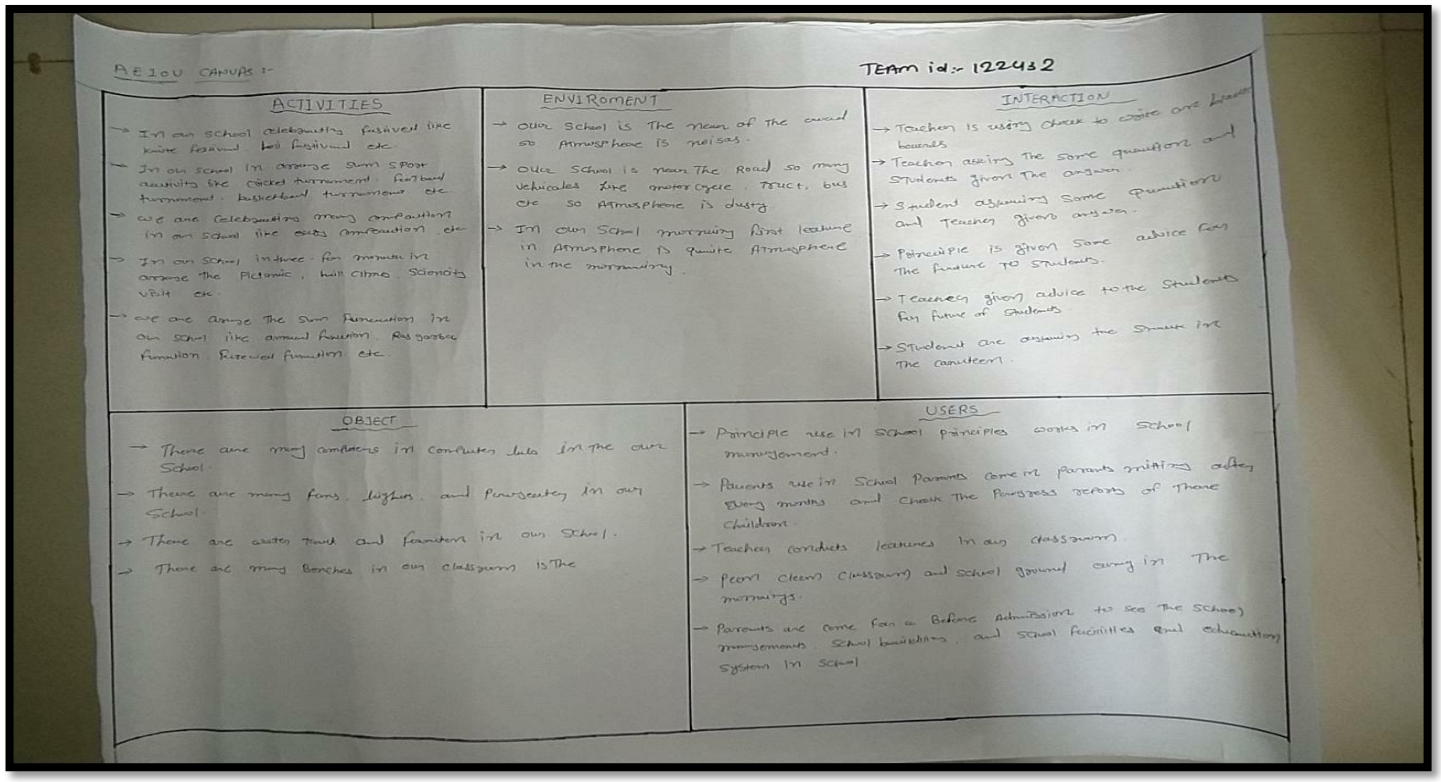


Figure 4.1: AEIOU canvas

4.1.3 Description:

ACTIVITIES: The activity canvas states the level of observations and priority given to the activities and processes occurring specifically in the domain and all the activities related to the domain

ENVIRONMENT: This canvas aims in giving clear clarification about the initial and ongoing environment in the domain. It gives information related to the noises, total environment and different factors affecting the industrial environment.

INTERACTION: In the interaction canvas, it deals with the different types of interactions in domain. The type of interaction may be between the domain official or may be the worker of the domain. But in such an industrial domain interaction level plays an important role as it helps in building the workmanship in a specific person.

OBJECT: Our domain being an tool shop, it's obvious that I should include many types of large and small scale machineries and taking observations and notes of the objects help in developing new and fresh ideas for fresher projects.

USERS: Industry and specifically a mass production industry would have many users within them. Many expiree need workers are also included in them and taking notes of such experiences would help in project planning and making.

4.2 Empathy Mapping Canvas

4.2.1 Introduction:

Empathy canvas is powerful tool that helps putting yourself in place of that particular person you might be looking at as a prospective customer or product user. Moreover, it permits you to quickly grasp their experience and where they are coming from.

4.2.2 Relevance:

Empathy canvas can be considered as very vital component of the documentation process. Empathy means feelings as someone. Therefore, it helps us to understand the feelings of the sufferings of various subjected objects by placing us in place of the subjects.

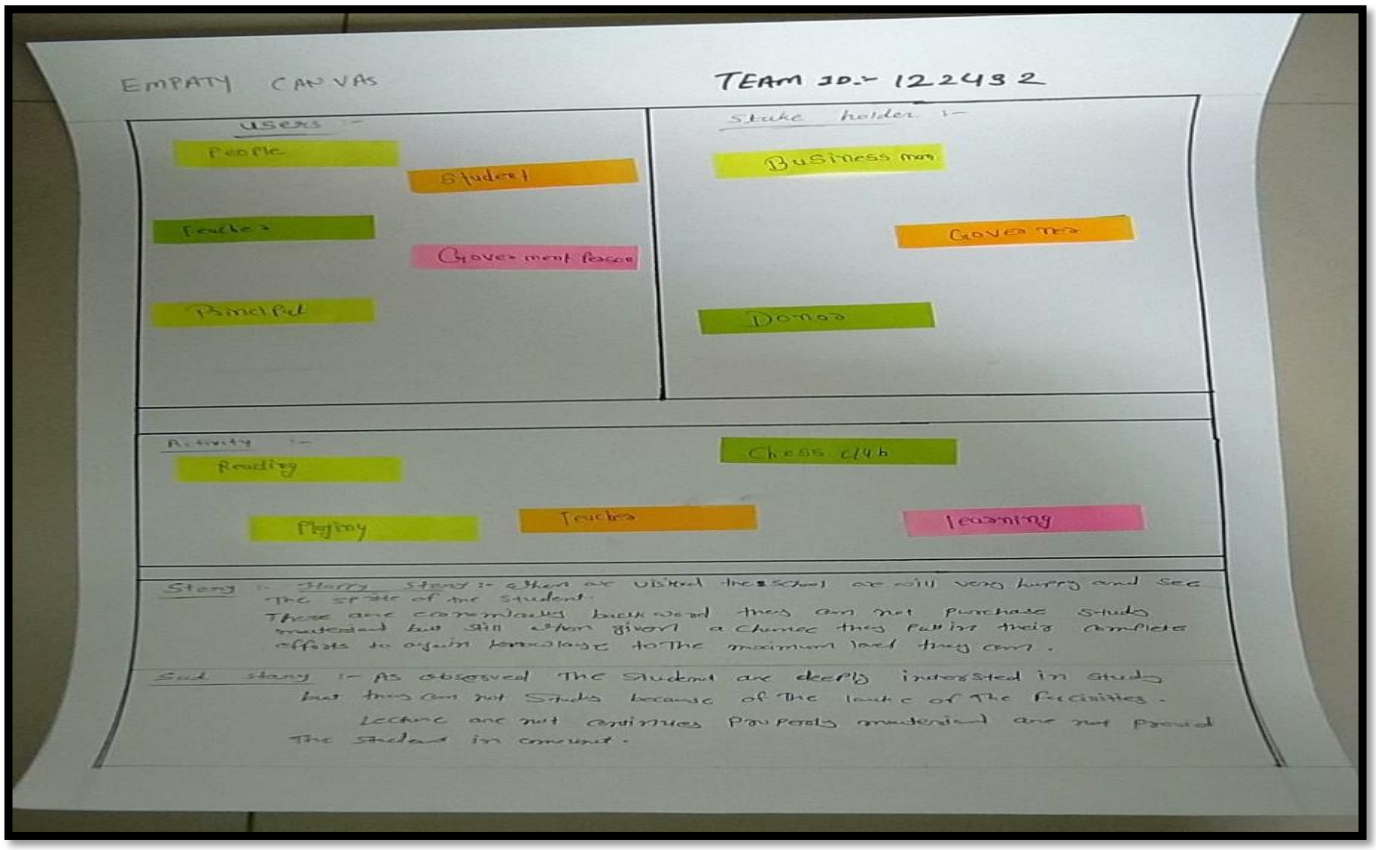


Figure 4.2: empty canvas

4.2.3 Description:

The empathy canvas aims at providing information about the users, stakeholders and different activities happening in our domain along with the happy and sad stories being discussed inside the domain.

User: As the domain suggests, there are many users associated with the domain whether be the owner or the sweeper all the personals are included under this category.

Stakeholder: Stakeholders are the persons associated with the usage of the domain apart from the users. They also possess certain authorities and powers as per the designations provided to them.

Activities: The activity section has the inclusion of all the activities performed under the domain. As shown in the picture there is a list of activities performed under the domain.

Storyboarding: Story Board discusses about the happy and sad incidents occurring inside the domain associated with the processes, persons and other factors affecting the domain.

4.3 Ideation Canvas

4.3.1 Introduction:

Making of ideation canvas is the innovative process promoting generation, development, and communicating new ideas and understanding it as a basic element of thought which may be visual, concrete, or abstract. Ideation consists of all levels starting right from a thought cycle, from innovation, to development, to actuation.

4.3.2 Relevance:

Ideation canvas helps us to relate our lives with the problems faced by our subjects and in modifying them with the possible and desired modification.

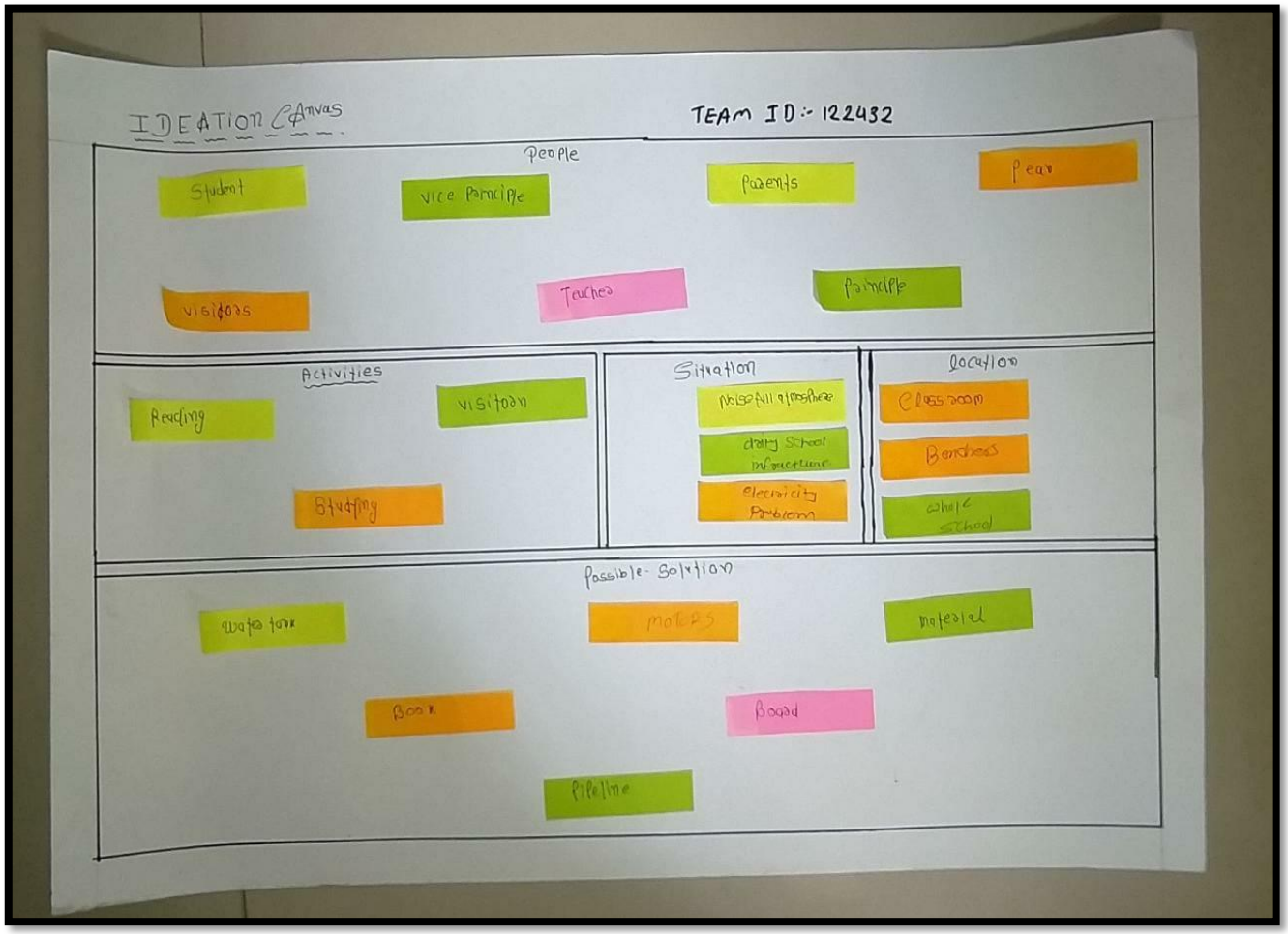


Figure 4.3: ideation canvas

4.3.3 Description

The Ideation canvas helps in providing ideas and serves the purpose as a raw material for the mind in case of thinking for the prototype, model and working of the model.

In order to execute the plan for a perfect working model it is necessary to assure that we have a strong backup in case of any ideation failure or materialistic failure.

Ideation canvas helps as a backbone of an innovative plan and helps in avoiding the risk of failure and eliminating it almost to nullification.

4.4 Product Development Canvas

4.4.1 Introduction:

Product development canvas is a product strategy on one page. Thousands of managers use product development canvas across hundreds of companies nowadays. The product development canvas is a strategic planning tool to any problem definition that allows the manager to map, design, describe and differentiate their product strategy on a single page.

4.4.2 Relevance:

Product development canvas contains the parameters like product purpose, product experience, users, product features and product functions. These parameters relate to the customer requirement, assembly of the components, product quality analysis and it also helps in revalidation of mechanism and provides a scope of improvement in design.

Ultimately product development canvas helps in the whole the procedure from identification of problem till the development of very first design and also allows the implementation of the current product.

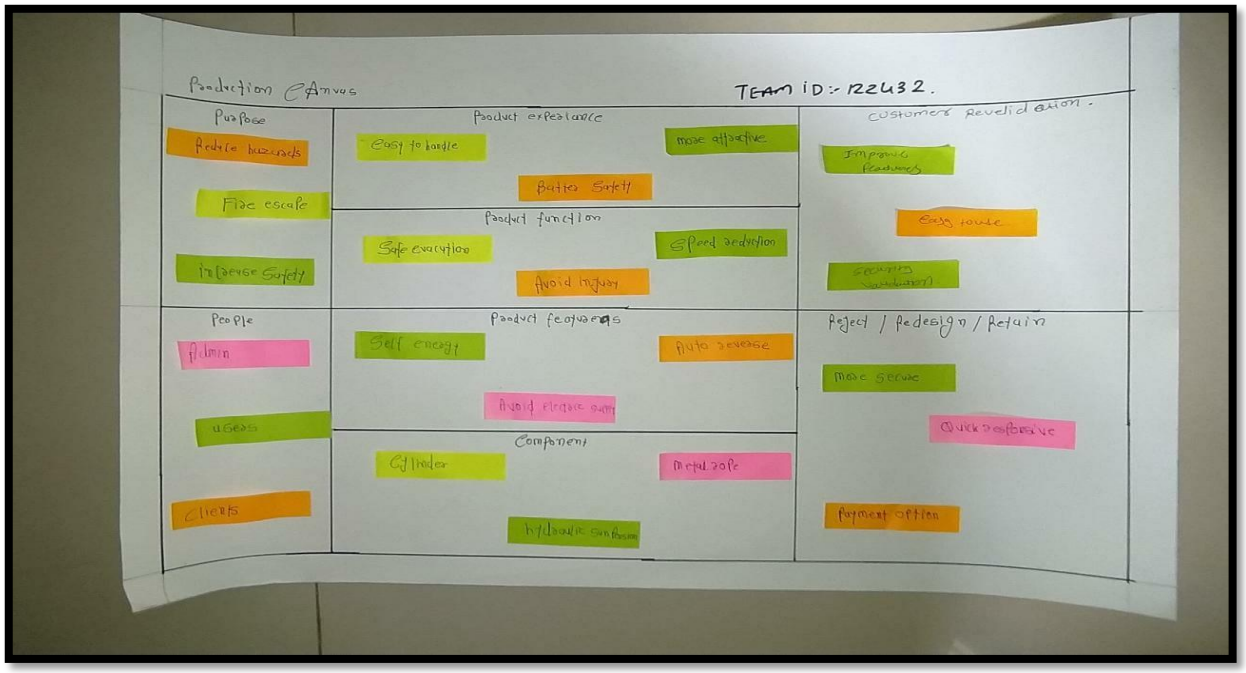


Figure 4.4: production canvas

4.4.3 Description:

Product development canvas is a product strategy on one page. Thousands of managers use product development canvas across hundreds of companies nowadays. The product development canvas is a strategic planning tool to any problem definition that allows the manager to map, design, describe and differentiate their product strategy on a single page.

Product development canvas contains the parameters like product purpose, product experience, users, product features and product functions. These parameters relate to the customer requirement, assembly of the components, product quality analysis and it also helps in revalidation of mechanism and provides a scope of improvement in design.

Ultimately product development canvas helps in the whole the procedure from identification of problem till the development of very first design and also allows the implementation of the current product.

4.5 Business Model Canvas

4.5.1 Introduction:

Business model canvas is used to validate the market significance of products and services which will be of technology nature in this case. Technology projects are often solutions or processes that solve a technical problem. However the market implementation of such solutions also require that the problem solution is designed to overcome not just the technical barriers but also market and business related barriers of costs, customer reach and collaborations and those that pertain to the practical nature of limited initial capacities within the team.

4.5.2 Relevance:

Business model canvas can be used to visualize such market problems and customer expectations. This exercise will increase the market potential and penetration of technology goods and services. This will make them more effective in market.

This exercise will bring discussions on viability and cost effectiveness into picture along with their clear impact. This exercise will enable students to have a clear understanding on Two Wheeled Automobile Side Stand Lifting Trigger Mechanism the steps required to ensure that whatever solution they develop as their project should have a user who can afford it with desired needs. This exercise also helps students to understand the true value of the proposed solution.

Figure 4.5: business model canvas

Chapter 5: Previous Affect for Design

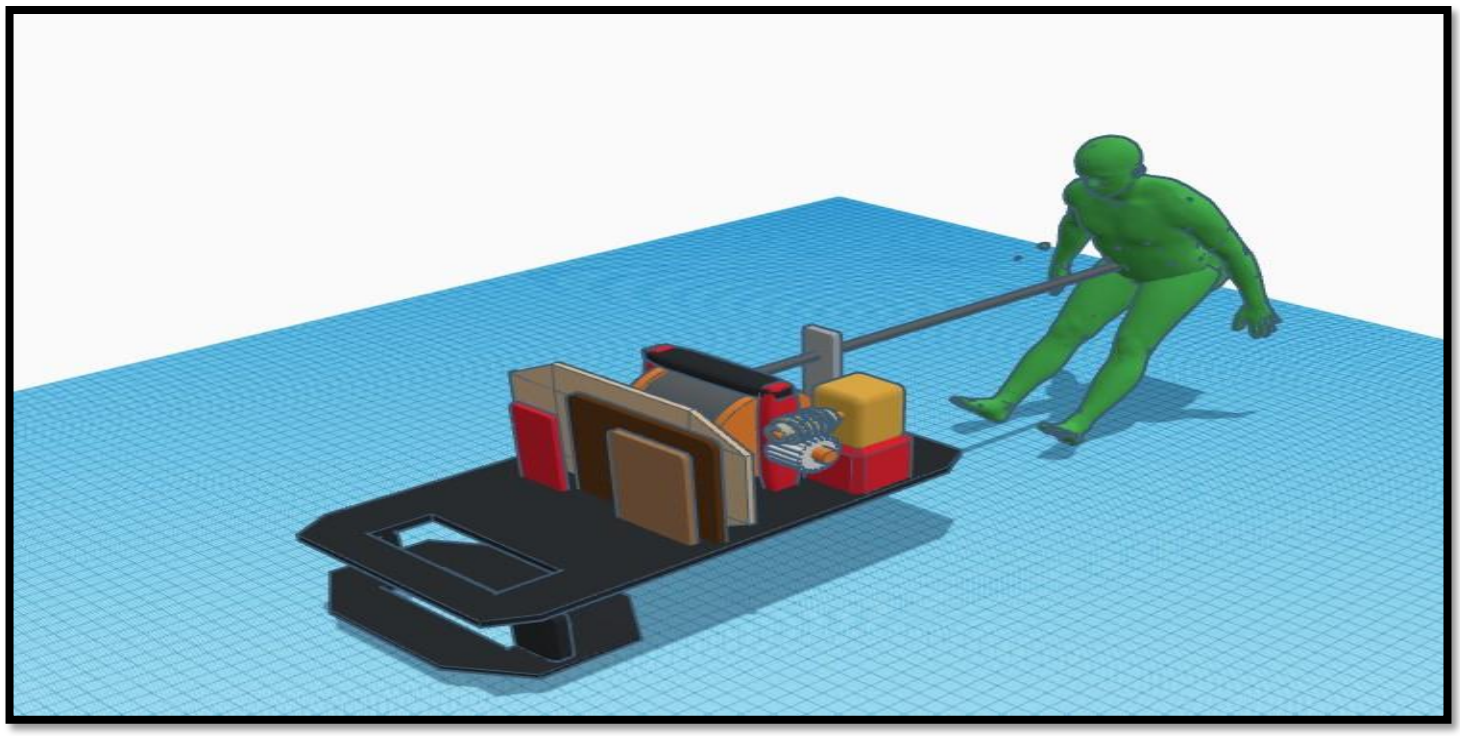


Figure 5.1

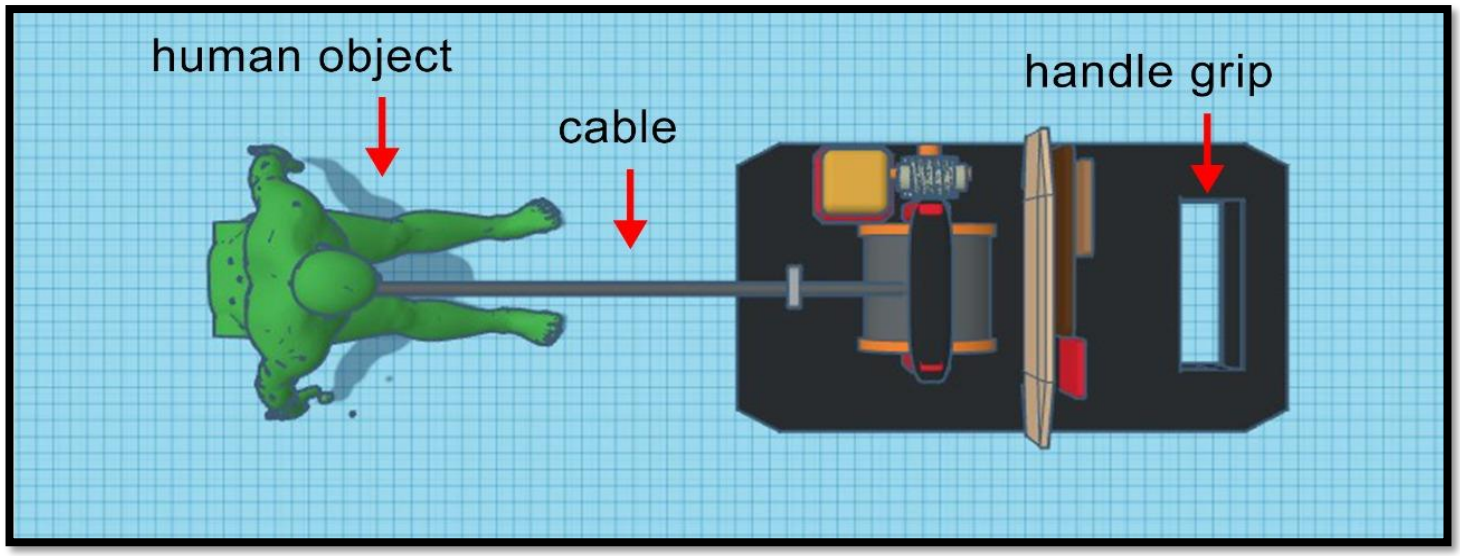


Figure 5.2

- This design is our basic concept with electrical motor to rotate cylinder, but we have to avoid electrical supply to compact wire-connection and remove fire hazards.

Chapter 6: Designing

After referring no. of designs and patents related to emergency escape device use for the multi storage building mechanism we found all possible solutions and choose the ultimate design which is described below.

6.1 Components

Part-1 Main shaft

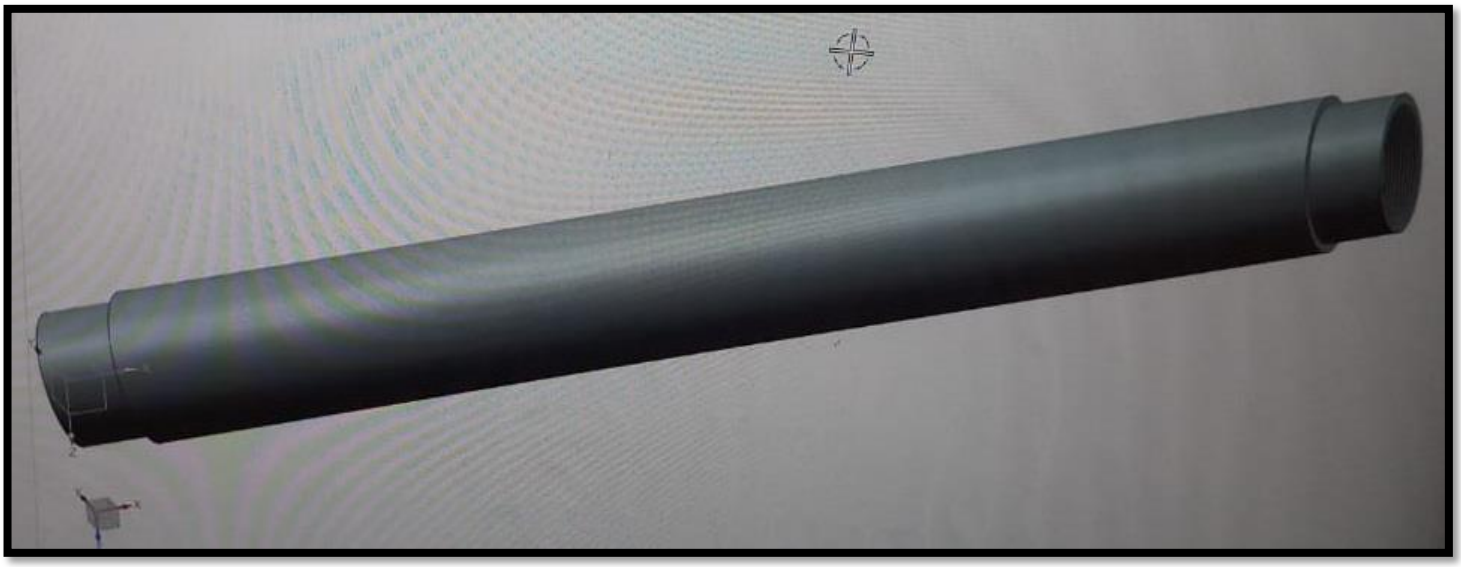


Figure 6.1: isometric view of cylinder

- Shaft is used to transmit the motion to other components, it rotates when tensile or some load applied to the rope, the shaft will rotate and weight will reached in the ground floor. It will give also motion to left-end and right-end screws. And it will connect the screws to the suspension shaft.

Part-2 Screws

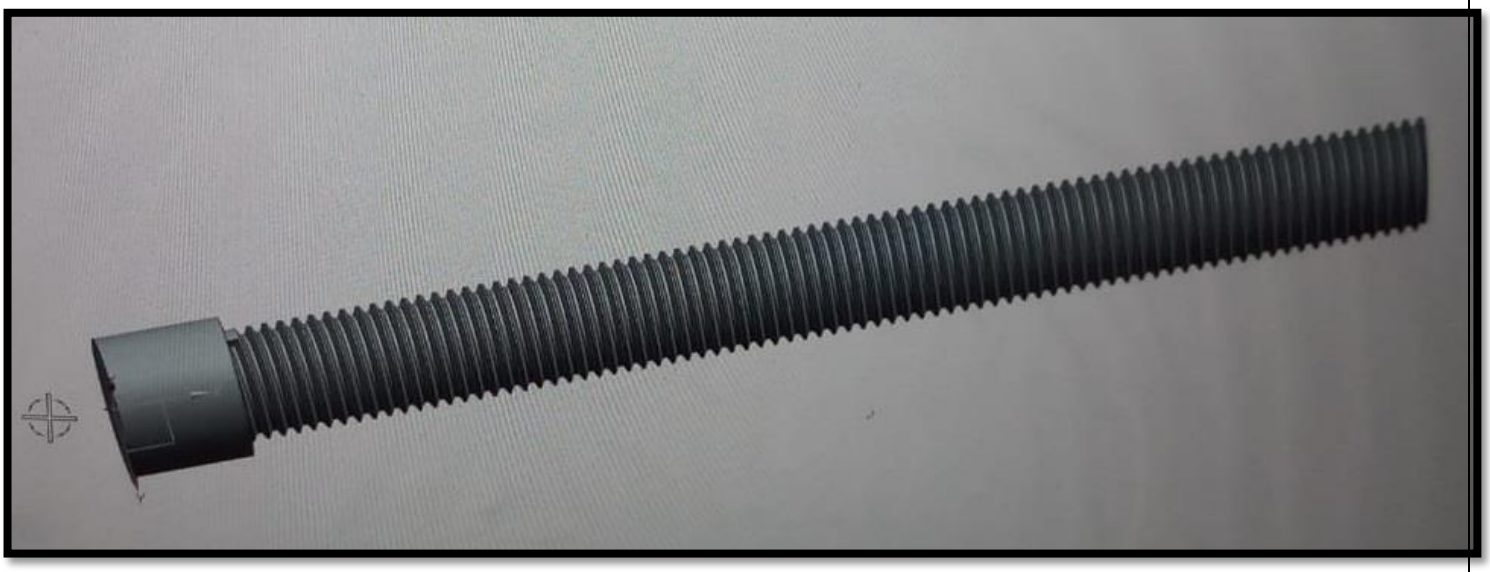


Figure 6.2: isometric view of left hand screw

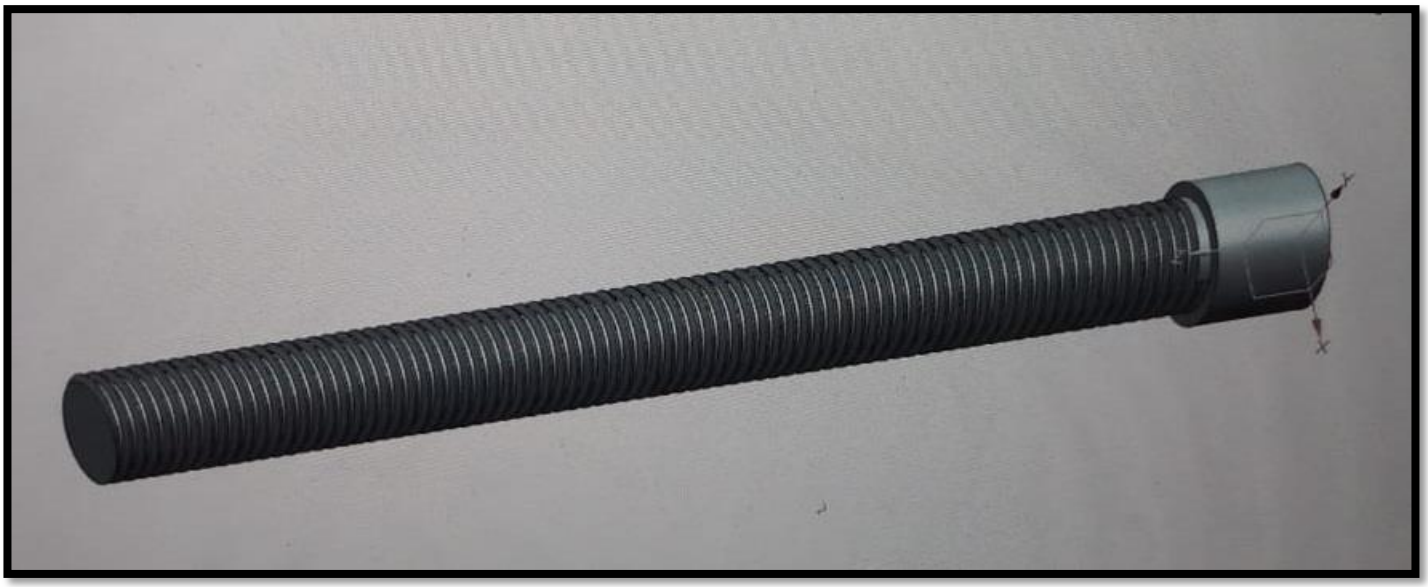


Figure 6.3: isometric view of right hand screw

- These are mainly functioned to connect the suspension with it through clutch system and the screws are compressing the piston rod of the suspension and when it release the screws rotating inward through the cylinder.

Part-3 Cone Clutches

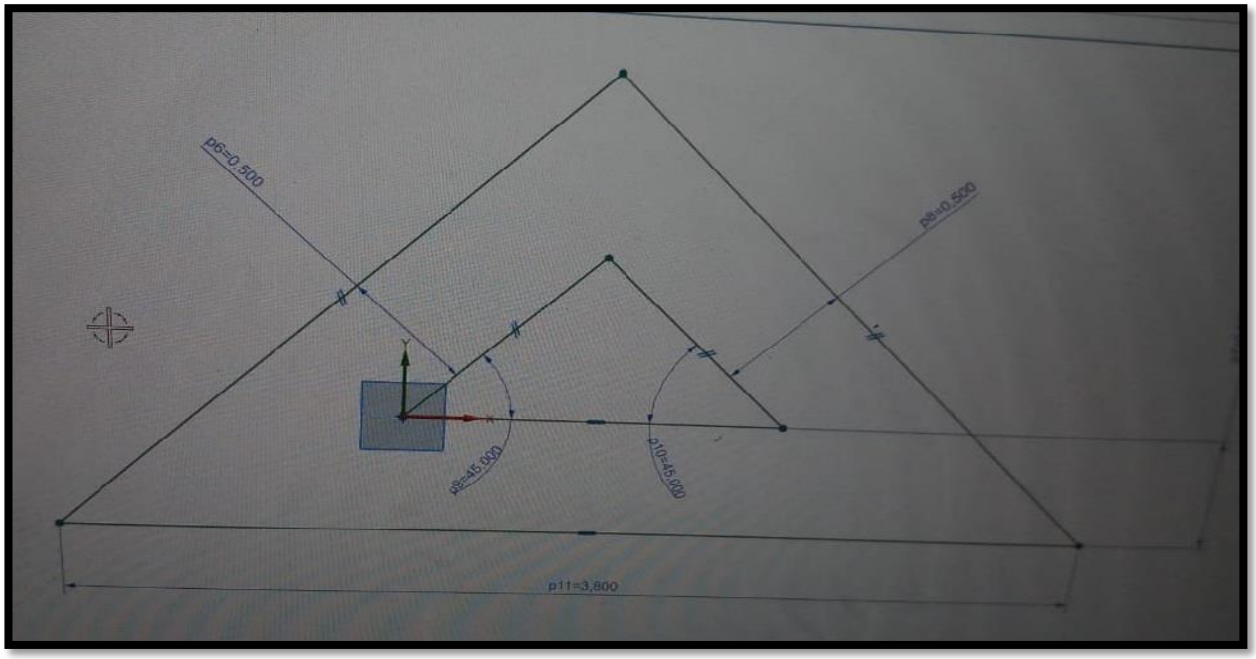


Figure 6.4: male come clutch view

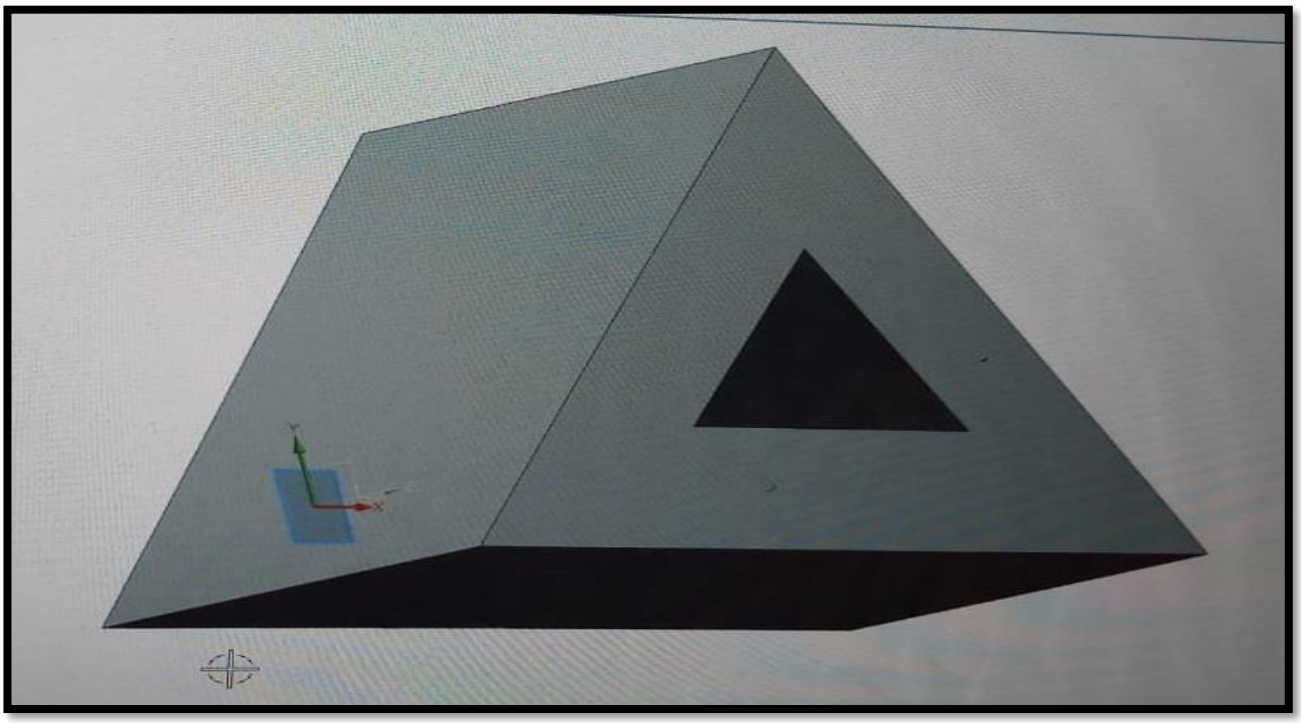


Figure 6.5: isometric view of male cone clutch

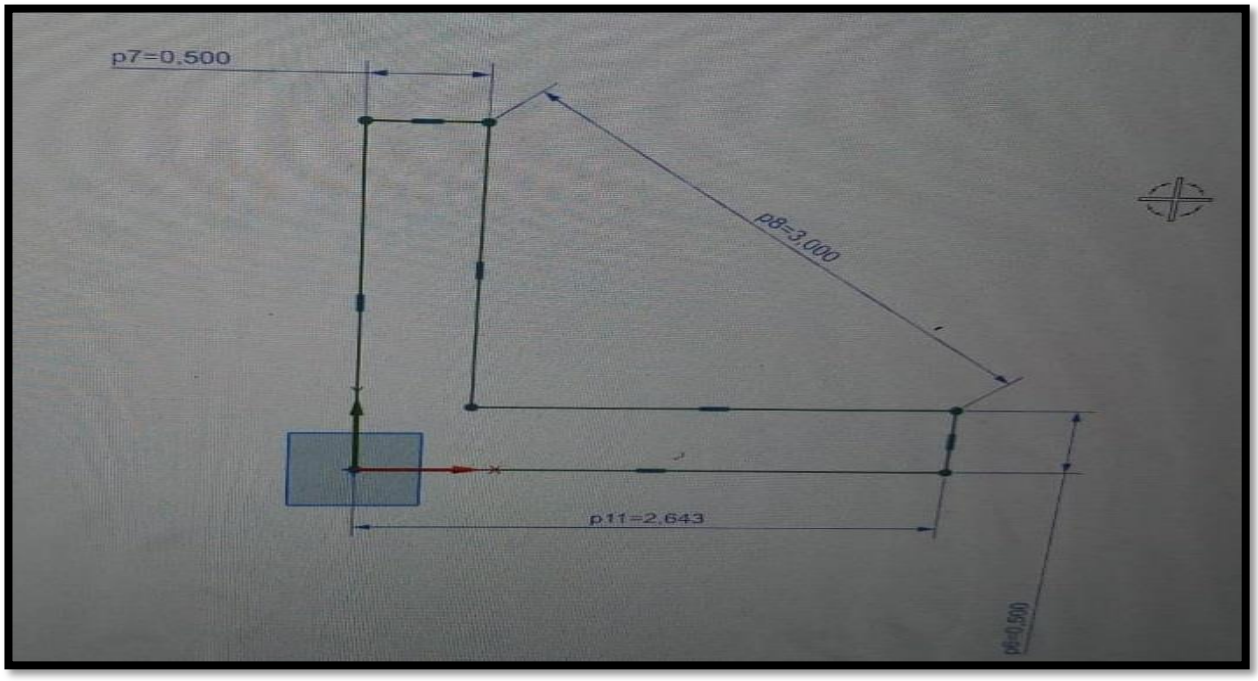


Figure 6.6: female cone clutch view

- The cone shape clutch is bound the motion transmission between the screw and suspension piston rod. It converts the circular motion of the screw in to the axial straight motion for the piston rod,

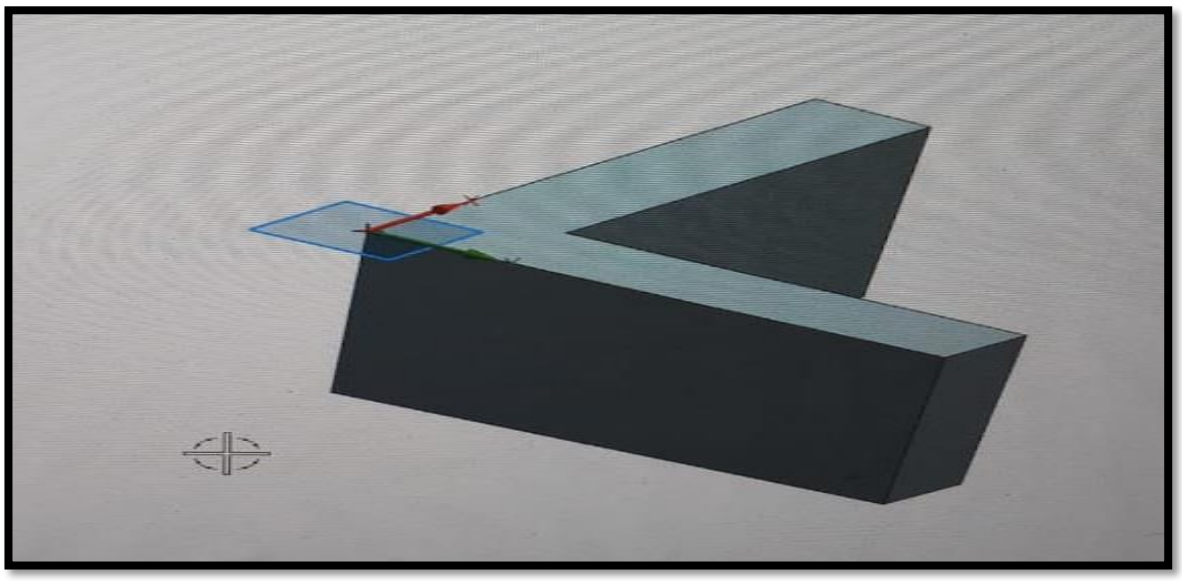


Figure 6.7: isometric view of female cone clutch

Part-4 Lifter Suspension

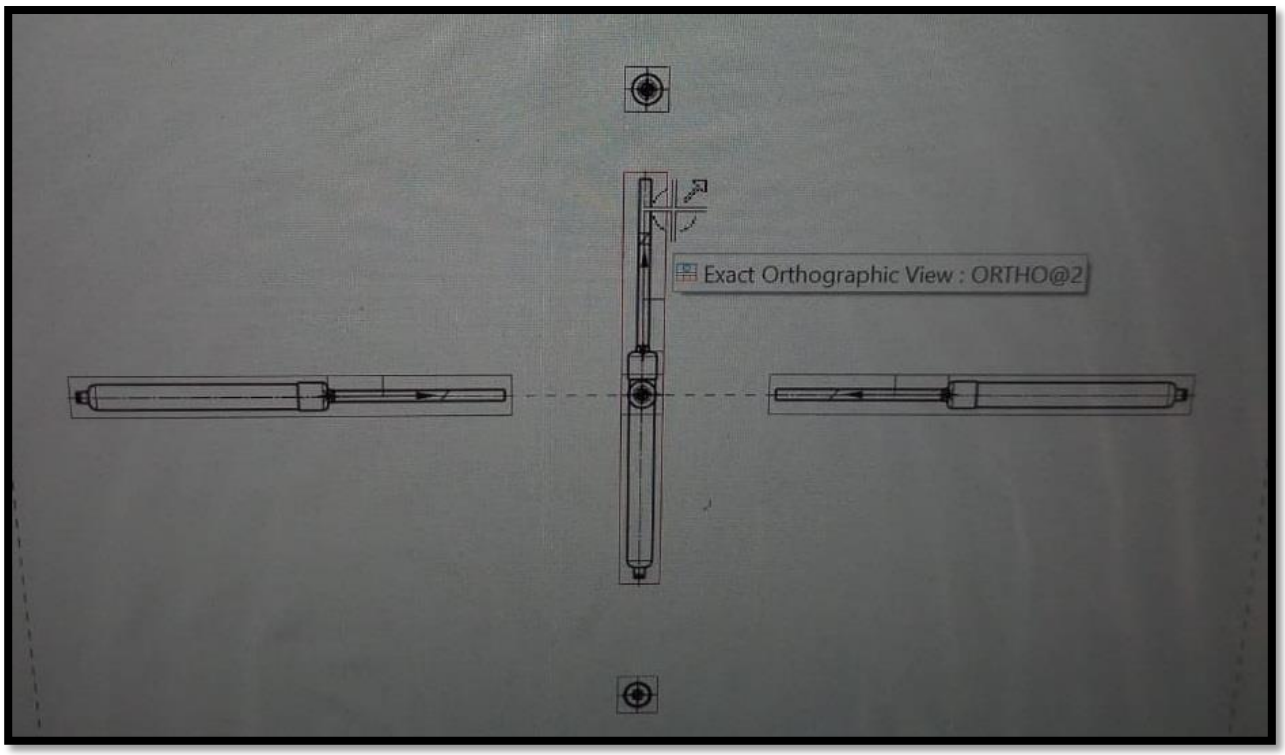


Figure 6.8: top view of hydraulic cylinder

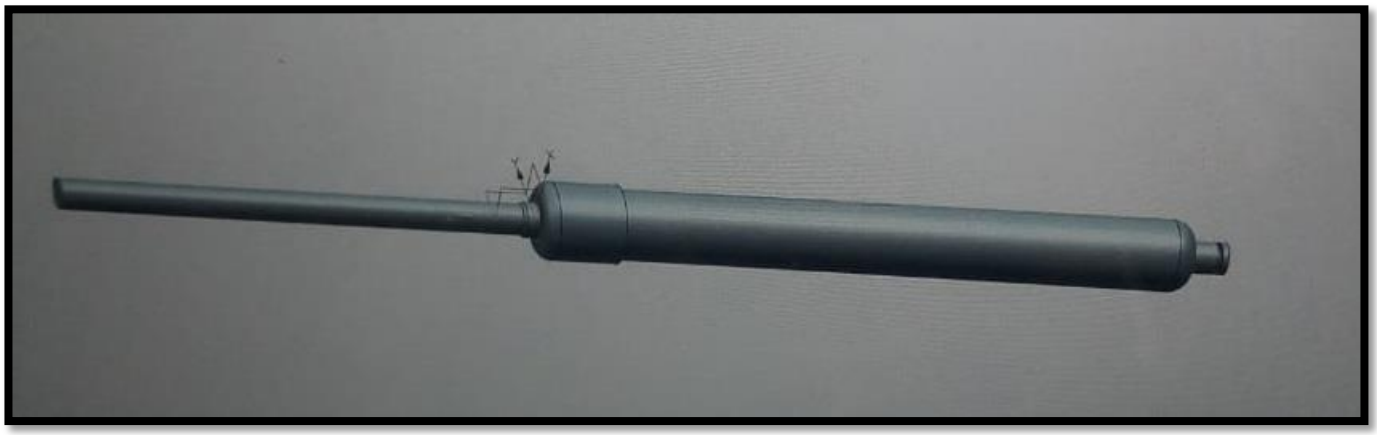


Figure 6.9: isometric view of hydraulic cylinder

- The hydraulic cylinder consists of a cylinder barrel, in which a piston connected to a piston rod moves back and forth. ... The piston has sliding rings and seals. The hydraulic cylinder carried 150 to 200 kg load and hydraulic cylinder size is 6 inch.

Part-5 Metal Rope

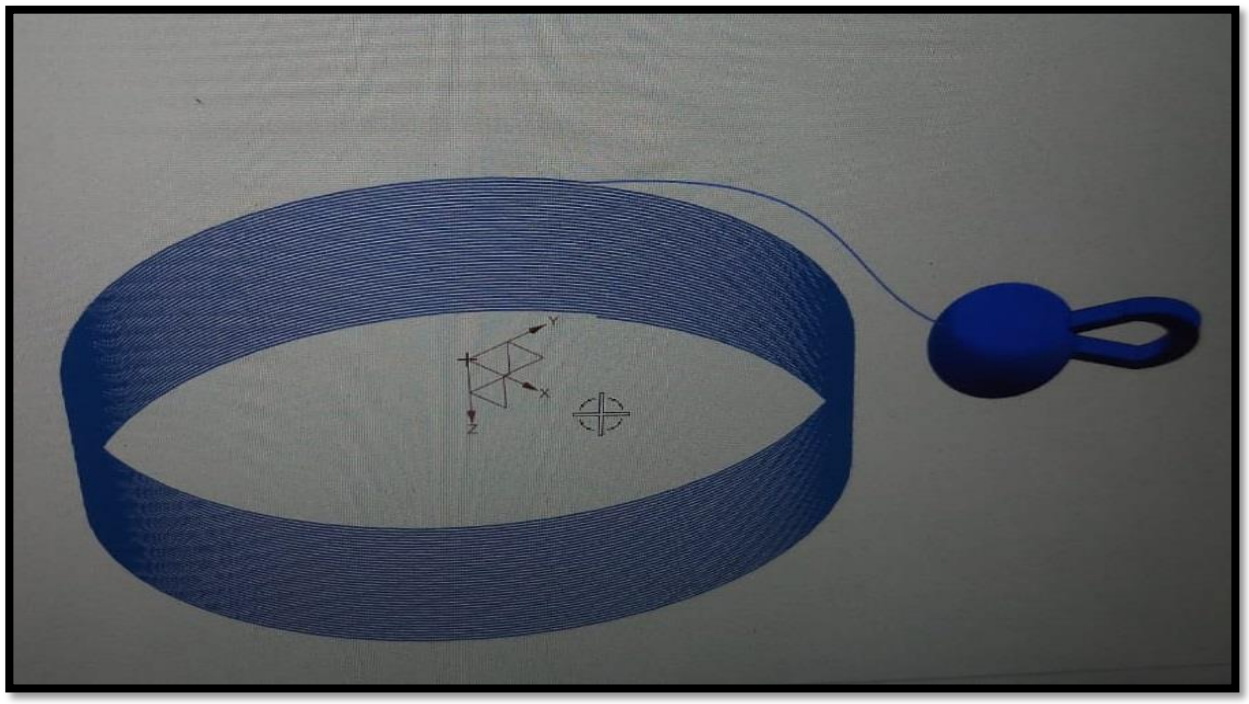


Figure 6/10 rope

- The rope is main instrument to carry the weight in upward and downward position, when the load is attached to rope and the tensile force applying in ground position. So, rope is stretching to the ground surface.

6.2 Assembly

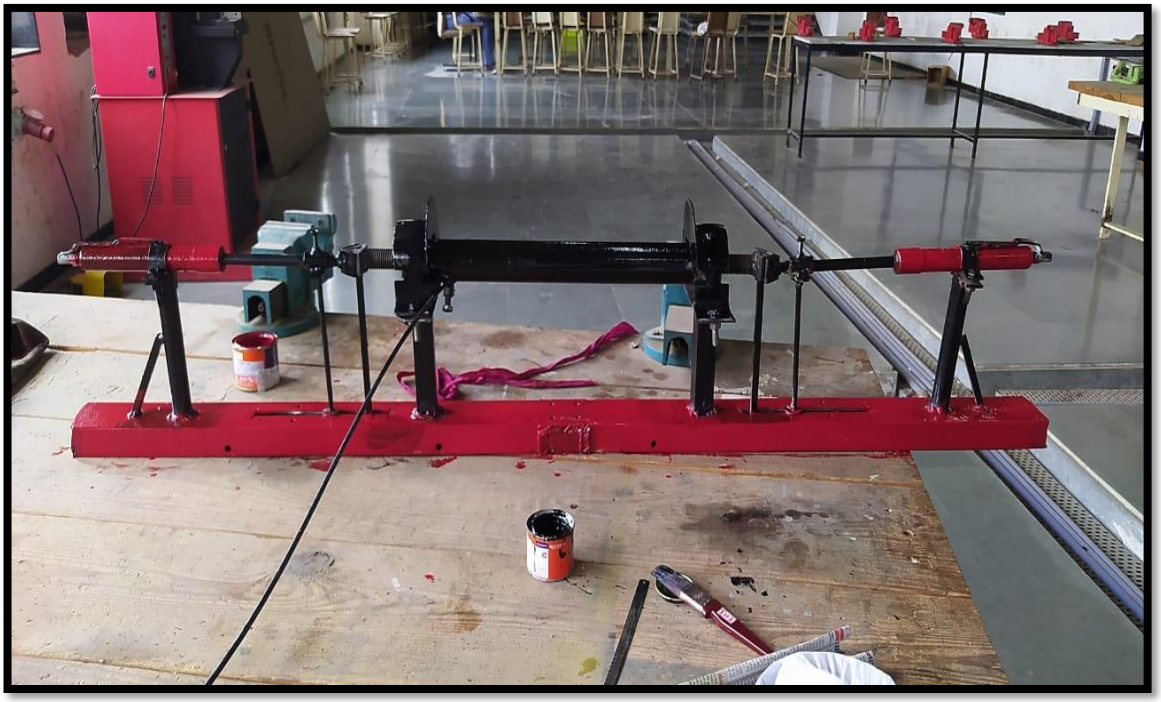


Figure 6.11: Actual Product

- The both fig. indicates the whole construction of our device, the actual components are structured as the frame as shown above fig. so, it can hang on the floor of window or balcony, as well as sliding arrangement is also done to move lifter easily.

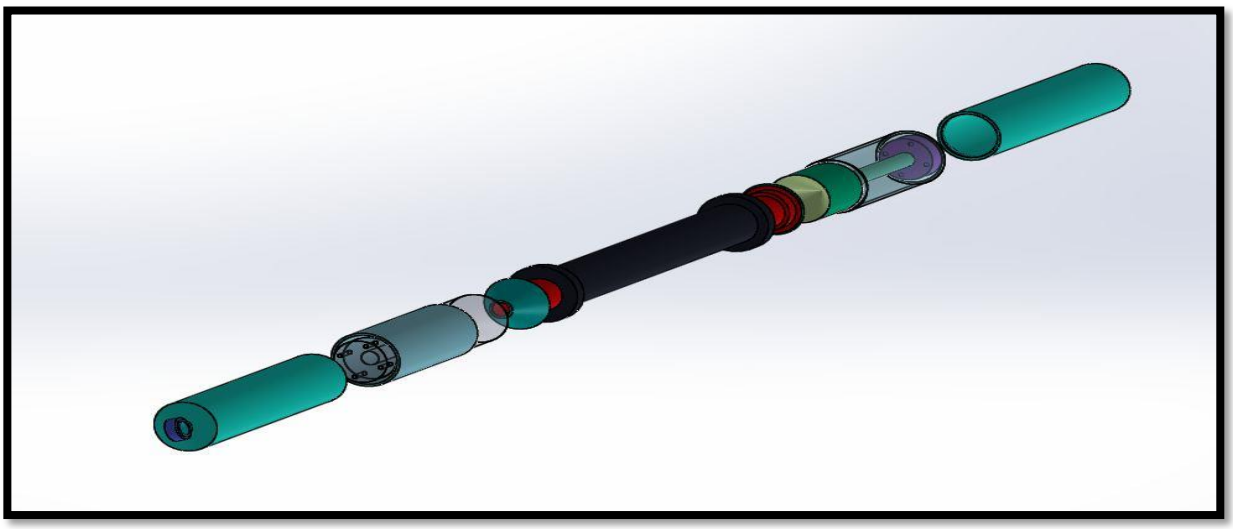


Figure 6.12 Exploded view of assembly

6.3 Working Procedure:

- Above 1st design is an actual Emergency Evacuate Device proto-type, in this proto-type there are different components likes shaft, screws and lifter suspension, Rope and When some load or human will develop tensile load on rope.

- Due this the rope tensile will result in rotation of cylinder or main shaft, the cylinder will rotate and the screws which are inserted in the inner bore of cylinder, it will rotate in sliding the outer of the cylinder.

- The clutch type parts are attached at the left-end and right-end screws, there are both male parts of cone type clutch, the another female parts are attached at both side of lifter suspensions, when the screws slides with rotations outward directions, the clutch are connects with each other and transmit the motion to the lifter suspension.

- This will lead to decrease the speed of rotating cylinder, because of when screw transmit the motion it compress the piston rod it will compress the fluid and it will resist the speed.

- By this, the load or human can easily reached the floor or escape the floor without any serious injuries or hazards.

Chapter 07: Calculation and Result Analysis.

1. Main shaft/Cylinder:

- Outer dia. = 49 MM
- Inner dia. = 31.75 MM
- Length = 457.2 MM
- Thread length from both end = 50.08 MM

2. Left-end & Right-end Screws:

- Thread length = 254 MM
- Head dia. = 31.75 MM
- Head length = 25.4 MM

3. Bearings:

- Bearing code = 6209
- Inner dia. = 45 MM
- Outer dia. = 85 MM
- Length = 25.4 MM

4. Cone Clutch parts:

- Cone Angle = 90 degree
- Thickness = 12.2 MM
- Length = 76.2 MM

5. Lifter Suspension:

- Piston Rod = 152.4 MM
- Load Capacity = 150 Kg per each one

Chapter 08: Advantages & Applications.

8.1 Advantages:

- This device is easy to use because only mechanical/hydraulic system.
- This system can be optimizing multiple times and universal for every hazardous situation like Fire, Earthquake, and Demolition of Building etc.
- The high load carrying rope and speed reduction by suspension are benefits for safety.
- The ergonomic design gives better work with zero injuries.
- All age of persons can use this like children, aged persons, handicap etc.

8.2 Applications:

- All residential multi-floor apartment is suitable for this system,
- Commercial complex like School, Hospitals, Hostels, and Hotels are also suitable and can use our product.
- Office, Shopping Mall, Govt. quarters are applicable for this device.

Chapter 09: Conclusion.

9.1 Conclusion:

By using this device or method for emergency evacuate system, there is no need of any external energy supply, it works only by mechanical/hydraulic energy. So, no issues of electrical shock circuit and with optimum safe and reliable mechanism which kind be for all categories of persons. This system can be Eco-friendly and usable for multiple times.

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