Effective Space Utilisation in Auditorium Using Smart Chairs

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Abstract- *The procedure entails arranging chairs and tables in the stage with less manpower and in less time. To produce the final outcome, the project's mechanisms are a crank-lever mechanism and a hydraulic lift mechanism. These two systems, when coupled, will aid in the arrangement of chairs and tables. The chairs and tables are set up so that it should be positioned over the table. The hydraulic lift that lifts the arrangement to the stage is controlled by a crank-lever mechanism when the chairs are to be arranged. This reduces the amount of manpower required as well as the amount of time it takes.*

Keywords- Hydraulic lift mechanism, Hydraulic crank-lever mechanism

I. INTRODUCTION

Hydraulic systems are employed in a wide range of industrial settings, as well as structures, construction equipment, and vehicles, and have a wide range of applications. Hydraulic equipment is used extensively in the paper industry, forestry, manufacturing, robotics, and steel processing. Hydraulic system-based equipment is difficult to beat as an efficient and cost-effective technique of creating movement or repetition. Although the purpose of each hydraulic system differs, they all operate on the same basic principle. Hydraulic systems, to put it simply, work by utilizing a pressured fluid to function and accomplish duties. Another way of putting it is that the pressurized fluid keeps everything running smoothly. Hydraulics are often employed in large machinery because to the tremendous power of liquid fuel in hydraulics Pressure applied to a contained fluid at any point in a hydraulic system is transmitted unchanged. The pressurized fluid exerts force or power on every area of the contained vessel's section. Operators can lift huge objects and do exact repetitive jobs with ease thanks to the usage of this force, which varies depending on how it's applied. This paper combines two unique strategies in this project to get the ultimate result. A crank and lever mechanism, as well as a hydraulic lift mechanism, are included in the project's mechanisms. When these two devices are combined, it will be easier to arrange chairs and tables. The chairs and tables are arranged in such a way that it will be positioned over the table.When the chairs are to be set, the hydraulic lift that lifts the arrangement to the stage is controlled by a crank and lever system. This cuts down on both the amount of manpower and the length of time it takes.

II. REVIEW OF LITERATURE

This work is inspired by journal papers published in international journals. These journal papers emphasized on the use of Scissor lift, joined with lever and hydraulic cylinders for lifting the vehicle to reduce the human effort. Hence, hydraulic lift results in easy and safe operation.

Georgy Olenin, et al[1] "Design of hydraulic scissors lifting platform" . This paper described the design and analysis of scissor lifting platform for both highest and lowest position. Also the working principle of scissor lift and types are discussed. Along with design the faults occurring during operation of scissor lift and their methods of elimination are provided in order to improve the productivity. Design calculations are carried out by using concept of free body diagram and standard formulas. Various cases of cylinder mountings are given which depends on angle of inclination of cylinder and the transferred force by cylinder on scissor arms. The analysis is carried out with the help of shear force diagram and bending moment diagram

AdityaMasiwal, et al[2] [2018] an Experimental investigation of Fabrication of Inbuilt Hydraulic Jack for Four Wheelers, International Journal of Research in Engineering and Technology. This paper explains that this project not only saves human effort but also reduces the replacement time during the time of puncture. Lifting capacity is more in hydraulic jack in comparison with pneumatic.

RSabarish, et al [3] [2017] an experimental investigation of Fabrication of Inbuilt Hydraulic Jack for Four Wheelers, in International Journal of Pure and Applied Mathematics. This paper concludes with the well advanced operation of hydraulic jack overcoming the manual operation of screw jack used in most of the auto service centers.

RSharavanan, et al. [4] [2017] an experimental investigation of Fabrication of Inbuilt Hydraulic Jack for Four Wheelers in International Journal of Mechanical Engineering and Technology (IJMET). The research survey revealed that few methods were adopted to lift the vehicle for reconditioning, repairing et al. Here they have mainly focused on difficulty in operating the hydraulic jack.

MayankAgrawal, et al[5] [2018]. A "Design and fabrication of hydraulic jack" an International Research Journal of Engineering and Technology, This paper is regarding the planning of fabrication of self-jacking mechanism in four wheeler cars. Driving a car in quite common now days, whereas tyre failure during the journey is also quite common and unexpected. In such condition lifting of car from the ground surface using a mechanical jack is a big task. This requires surplus manual effort and time. This mechanism overcomes these disadvantages. By pressing the button provided in the dashboard the jacking mechanism gets activated.

M. Kiran Kumar[6] "Design & Analysis of Hydraulic Scissor Lift". This paper is mainly focused on force acting on the hydraulic scissor lift when it is raised and lowered. Material selection plays a key role in designing a machine and also impact on several factor such as durability, reliability, strength, resistance which finally give rise to increase the life of scissor lift Modeling is carried out using SolidWorks software and analysis of system is completed using ANSYS The analysis of the scissor lift includes total deformation load, Principle stress, Von-misses stress and fatigue life. The computational values of two variety of materials such as aluminum and mild steel are collated for best results.

GaffarGMomin[7] "Design, Manufacturing & Analysis of Hydraulic Scissor Lift". This Paper has given the design as well as analysis of a hydraulic scissor lift. The design developed keeping in mind that the lift can be operated by mechanical means by using pantograph so that the overall cost of the scissor lift is minimized. Hydraulic hand pump is used to power the cylinder. Also such design is able to make the lift more compact and much suitable for medium scale work. Finally the analysis of the scissor lift was completed in ansys and all responsible parameters were analyzed to check the compatibility of the design values.

Problem Identification

The chair arrangements in the conference hall or auditorium need a lot of manpower. The chair within the hall required extra time to arrange.

Solution

The jack operated on the setup to lift and down the chair has been successfully completed with fully satisfaction. Man power and Time required for the arrangement is totally reduced with the help of this idea.

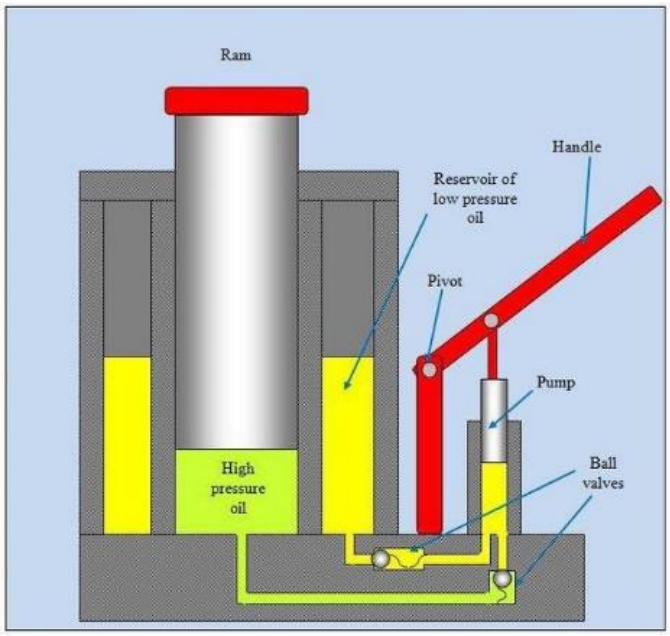
III. COMPONENTS AND DESCRIPTION

The major components are used in our project "Effective space utilization in auditorium using smart chairs"

1. Hydraulic jack
2. Lever
3. Chair
4. Table
5. Bottom base plate

Hydraulic jack

The hydraulic jacks provide lift to the snubbing unit traveling head through the traveling frame (or plate). They are configured vertically to provide this motion with all the rods pushing upward or pulling downward on the traveling head simultaneously A jack is a mechanical lifting device used to apply great forces or lift heavy loads. A mechanical jack employs a screw thread for lifting heavy equipment. A hydraulic jack uses hydraulic power The most common form is a car jack, floor jack or garage jack, which lifts vehicles so that maintenance can be performed. Jacks are usually rated for a maximum lifting capacity (for example, 1.5 tons or 3 tons). Industrial jacks can be rated for many tons of load.



Hydraulic jack

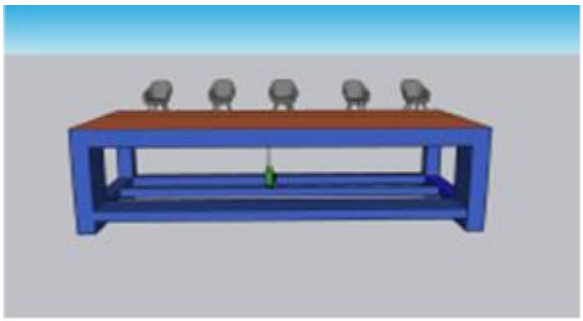
Bottle jack

Bottle Jacks. Named for the shape of their cylinder, which resembles a milk bottle, this type of jack is commonly used in the automotive industry.

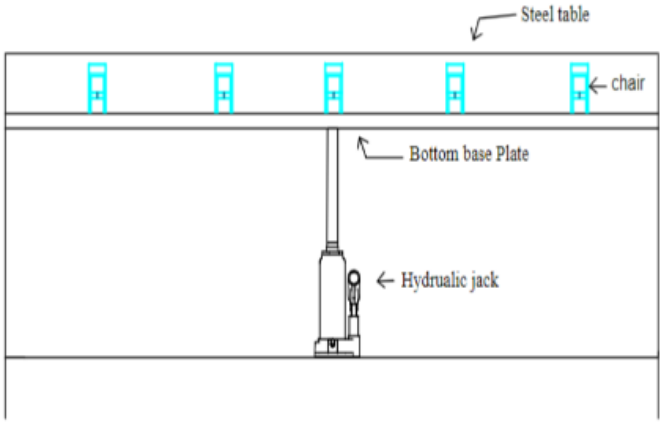
Working

For this purpose, a hydraulic jack is used. The chairs are hoisted from the lower platform to the upper platform using hydraulic jacks. Two platforms are required for this process, which is carried out utilising the crank-liver mechanism and the hydraulic principle. Chairs are fixed to the bottom platform, which is elevated to the top platform by moving the top platform to the side, and the bottom platform is fixed to the top platform after the requirement platforms are interchanged as before, and may use them as a plane floor.

Design



3D Model



Cad Model

IV. CONCLUSION

The jack used in the setup to elevate and lower the chair was finished effectively and to everyone's satisfaction. This paper contains ideas for future development plans for this project. This technology could be extended further into a unit that includes a civil construction system.

The goal of this project is to construct a basic hydraulic lifting machine that can lift loads up to 3000 kilogrammes at a maximum height of.25 metre. Successfully completed initial design goal of working the analysis. The right material selection for each component is chosen as a necessity. This design and construction will be more successful in terms of both strength and durability.

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