

Design and Fabrication of Brick Lifting Machine

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Abstract— In this paper, design and fabrication of brick lifting machine is discussed with the objective to reduce the time and human labour involved in lifting of bricks from one floor to another. The core idea is taken from the design of elevators but the design of the brick lifting machine is done such that it emphasizes on reducing the power consumption and carry the loads much as possible and ultimately increasing the efficiency of the machine. It is easily available for various construction purposes whether at small scale or large scale. The machine is useful for the conservation of time and human labour and it is also helpful for the locations where problem of man power appears. Our machine makes the best utilization of available resources to generate an efficient result in a fixed time frame as compare to other pre-existing brick lifting machines.

Keywords: Quarter HP Motor, Gearbox, Conveyor belt, Chain, sprockets

I. INTRODUCTION

It is quite difficult for the workers to transfer the bricks from one floor to another in a construction site. It becomes essential to find a better alternative of this problem in order to reduce their efforts as well as foreshortening of the process as it is done manually. Brick lifting machine is a machine which is used to lift bricks from one floor to another. The core idea is taken from the design of elevators but the design of the brick lifting machine is done such that it emphasizes on reducing the power consumption and carry the loads much as possible and ultimately increasing the efficiency of the machine. This machine is designed for lifting 80-90 bricks in 1 min for 5 feet wall and according to the calculations done the power of the motor which will be required is 186.5 W. This machine will also reduce the risk involved in carrying the bricks manually and it will also save the workers from any type of injury and as it is a onetime investment machine, hence, it will reduce the labour cost too.

II. LITERATURE SURVEY

Brick lifting machine is used to lift bricks from one floor to another. The designing of machine is on the basis of design of the elevators but the advancement is done on reducing the power consumption and adjustment of slope of machine. This machine will be advantageous as it will reduce the time required to lift the bricks from one floor to another. [1]

The design approach for building brick lifting machine, like factors and parameters for conveyor belt that need to be considered corresponding to maximum load conditions, height, capacity, and speed, roller diameter, belt tension and power. He also described the mechanical principals and mathematical formulae to find these factors and drive unit which will be suitable for that purpose. [2]

Conveyor belt is a loop of flexible material used to link two or more rotating shafts, most often parallel. Belts

may be used to transmit power efficiently, or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys. In a two pulley system, the belt can either drive the pulleys normally in one direction, or the belt may be crossed, so that the direction of the driven shaft is reversed. As a source of motion, a conveyor belt is one application where the belt is adapted to continuously carry a load between two points. [3]

The chain drive systems as it is important to understand the concepts and terminology associated with chain drive systems. The design of a chain drive demands the requirements of load, and description of driver and driven speeds and their units along with peak load, center distance and operating conditions. He also makes us clear about the parameters of chain drive unit for maximum and minimum load, requirement of speed, power transmission with the help of mathematical formulae and mechanical principles; he also stated the importance of chain drive over Belt River. [4]

A. Conclusion drawn from literature review

Following conclusions were drawn from the literature: -

- After a lot of literature survey on previously designed elevators and then putting the concept of elevators we have designed our brick lifting machine and this paper will prove efficient for understanding the concept of the lifting machine as it consists of all the required analysis of each and every component such as the analysis of conveyer belt, analysis of gear box, the load and power calculations.
- We had focused on minimum power consumption and efficiency, we had tried our level best to make this project a major source of for designing of construction lifts such as our brick lifting machine and we hope that it will be much advantageous during the construction work to lift the bricks easily in minimum power consumption and higher efficiency and there are further many possibilities of improvement in it.

III. GAP OBSERVED

As it takes quite a considerable time for the initial set up of the pre-existing material lifting machine, our machine is further enhanced such that the whole machine can be setup abruptly.

It is cost effective and time efficient comparing to the pre-existing material lifting machine.

This machine takes less time for loading and unloading of the bricks as machine runs continually.

We can also use chain link mechanism to increase the lifting height of the machine.

IV. PROPOSED METHODOLOGY

We took cast iron channels for making frame of the machine and providing support to the rollers. For fastening these rollers on the channels we performed drilling operation on the

channels to provide holes in these channels and fixed both the ends of the rollers in these holes.

Then we fixed roller bearings on the ends of these rollers to provide additional rolling support to the rollers, after this we mounted the conveyor belt on the frame with the help of belt hook.

For tightening the conveyor belt, we adjusted the top roller with the help of screw tightening. Now for rotating the conveyor belt over these rollers we implanted a chain-sprockets mechanism on the lower roller of the machine.

The sprocket is attached with gear with the help of chain. The chain at one end is connected with sprocket and is connected with the gear at other end.

The gear is attached in the gearbox; here we are using worm and worm wheel gear mechanism to reduce the motor speed up to desired level. To run this whole mechanism a quarter HP motor is used which is connected to the gearbox via coupling.

Now as the motor is started it rotates the shaft and transfer the power to the gearbox via coupling, the transmitted power is the transferred to the chain sprocket mechanism to rotate the rollers attached to the sprocket, this rotation in turn drives the conveyor belt and the bricks are lifted through the stairs mounted on the conveyor belt.

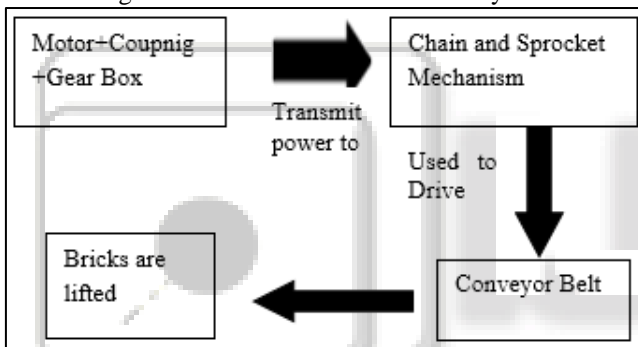


Fig. 1: Block diagram of machine

V. CONCLUSION

The Propose of this Project is to reduce human efforts and make construction system more economical by transferring construction resources (carried by labour) from one floor to another floor using slant chain drive machine with the use of electrical energy. Transfer of construction material like cement, bricks etc. which are usually carried by labour is time taking. Issue can be reducing by brick lifting machine, it can reduce time as well as their efforts. However, it will be costly to manufacture for industrial purpose. But it can be consider one time investments, although it will reduce labour cost too.

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