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MECHANICAL HANDLOOM MACHINE

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Abstract: This project "MECHANICAL HANDLOOM MACHINE" is for weaving the clothes by the use of mechanical energy with lesser human effort input.

The main soul objective of this project is to weave the clothes in an eco-friendly manner with mark able high efficiency. By using this, we can reduce the human efforts, especially hand and foot movements.

This machine is working on the nexus of the following mechanisms such asSlider Crank mechanism, Rope and Pulley mechanism with a Gear arrangements and various machine elements also used for achieving the higher mechanical efficiency.

In current using conventional handloom, it is being fully operated by hand and foot movements but in this mechanical handloom machine it has less human inputs.

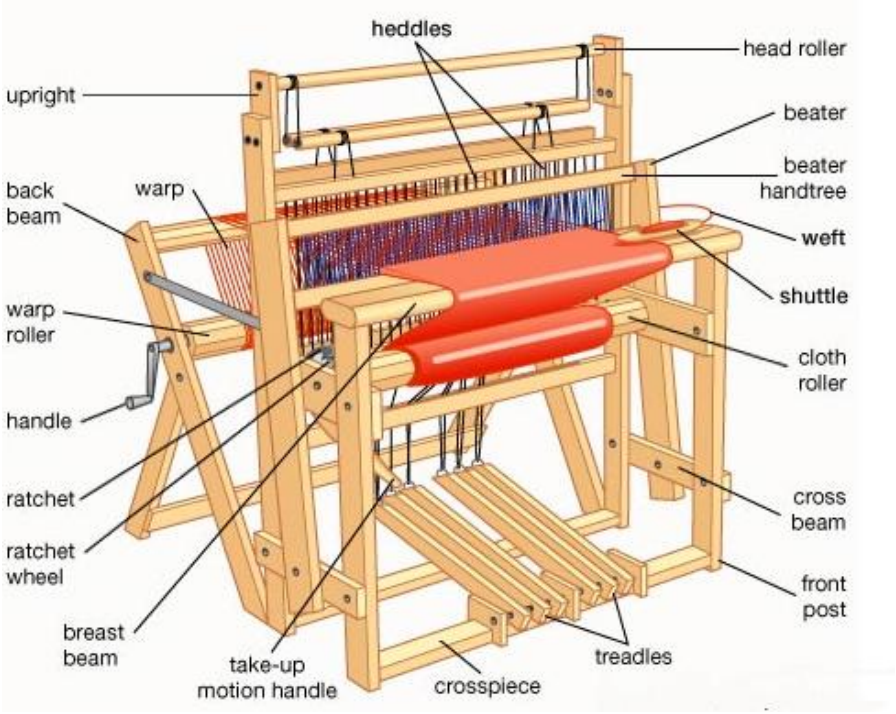
In conventional handloom, **Reed** and **Heddles** that are very important components for weaving process that has been efficiently activated by using **Slider Crank mechanism** and**Rope and Pulley mechanism** in this handloom machine.

The scope of the project is to increase the mechanical efficiency from 40% to75%

INTRODUCTION OF WEAVING PROCESS

- Weaving is a method of textile production in which two distinct sets of yarns or threads are interlaced at right angles to form a fabric or cloth. Other methods are knitting, felting, and braiding or plaiting.
- The longitudinal threads are called the warp and the lateral threads are the weft or filling. The method in which these threads are inter woven affects the characteristics of the cloth.
- Cloth is usually woven on a loom, a device that holds the warp threads in place while filling threads are woven through them.
- A fabric band which meets this definition of cloth (warp threads with a weft thread winding between) can also be made using other methods, including tablet weaving, back-strap, or other techniques without looms.
- The way the warp and filling threads interlace with each other is called the weave. The majority of woven products are created with one of three basic weaves: plain weave, satin weave, or twill.
- Woven cloth can be plain (in one color or a simple pattern), or can be woven in decorative or artistic design.

- In conventional handloom, reedand heddle that are very important components for weaving process that has been efficiently activated by using slider crank mechanismandcam follower mechanism in this handloom machine.
- In the Mechanical Handloom Machine, we have modify the reed movement by the bevel gear arrangements with the given handle input.



- Women wove items at home for family use. By the end of the 19th century weavers were simply mill workers who tended several water or steam powered looms at a time. The increased speed of production brought more textiles to the average farmhouse and rendered.

BODY OF THE ARTICLE

WEAVING PROCESS

- Weaving involves using a loom to interlace two sets of threads at right angles to each other: the warp which runs longitudinally and the weft that crosses it.
- One warp thread is called an end and one weft thread is called a pick. The warp threads are held taut and in parallel to each other, typically in a loom.
  Weaving can be summarized as a repetition of these three actions, also called the primary motion of the loom.
- **Shedding**: Where the ends are separated by raising or lowering heddle frames (heddles) to form a clear space where the pick can pass.
- **Picking**: Where the weft or pick is propelled across the loom by hand, an air-jet, a rapier or a shuttle.
- **Beating-up or battening**: Where the weft is pushed up against the fell of the cloth by the reed.
  The secondary motion of the loom are the:
- **Let off Motion**: Where the warp is let off the warp beam at a regulated speed to make the filling even and of the required design
- **Take up Motion**: Takes up the woven fabric in a regulated manner so that the density of filling is maintained.
- The tertiary motions of the loom are the stop motions: to stop the loom in the event of a thread break. The two main stop motions are the:

1) Warp stop motion
2) Weft stop motion

Basic components of a Mechanical Handloom

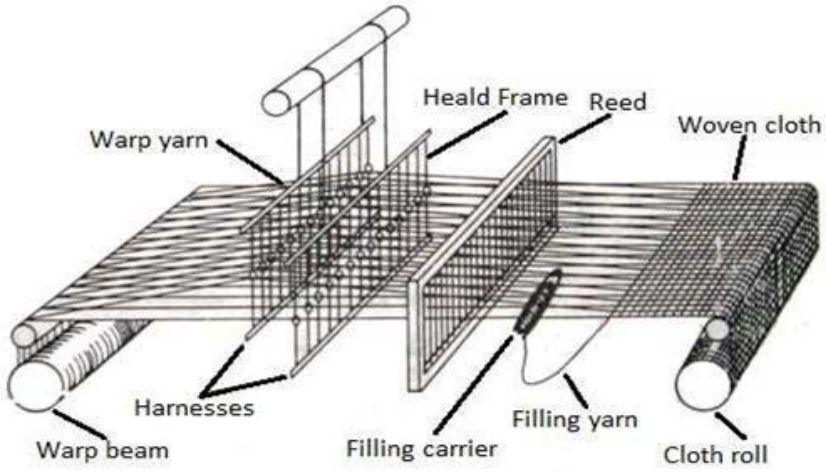


Figure: Basic structure of a loom

1. Heddle:
It is also called Heddle. It holds the warp yarns in a place.It also helps in shed formation. It is used for determining the warp thread density in a fabric.

2. Heddle shaft: It is also known as harness, the wood or metal frame that holds the heddles in a certain position in the loom is called harness. Number of harness available in loom usually more than one.

3.Shuttle:
This is used for the interlacement of the warp & weft yarns.

4. Bearing:

A part of a machine that allows one part to rotate or move in contact with another part with as little friction as possible.

5. Clamps:

A device is used to bind or press or holds the bearings firmly with stable.

6. Cylindrical Rods:

It is a cylindrical body in which the rod is used in such way that transmits the power to the gear and crank.

7. Connecting Rod:

It is a link for transmitting motion and force between a rotating and a reciprocating part, as between crank and slider.

8. Rope and Pulley:
The rope and pulley are attached to the heddleon one side and the other side is connected to the pedal in the machine.
It is used to actuate the hooks in the heddle for up and down motion.

9. Reed:
It is generally comb which is used to separate yarns.it also beats up the yarns in weaving process.

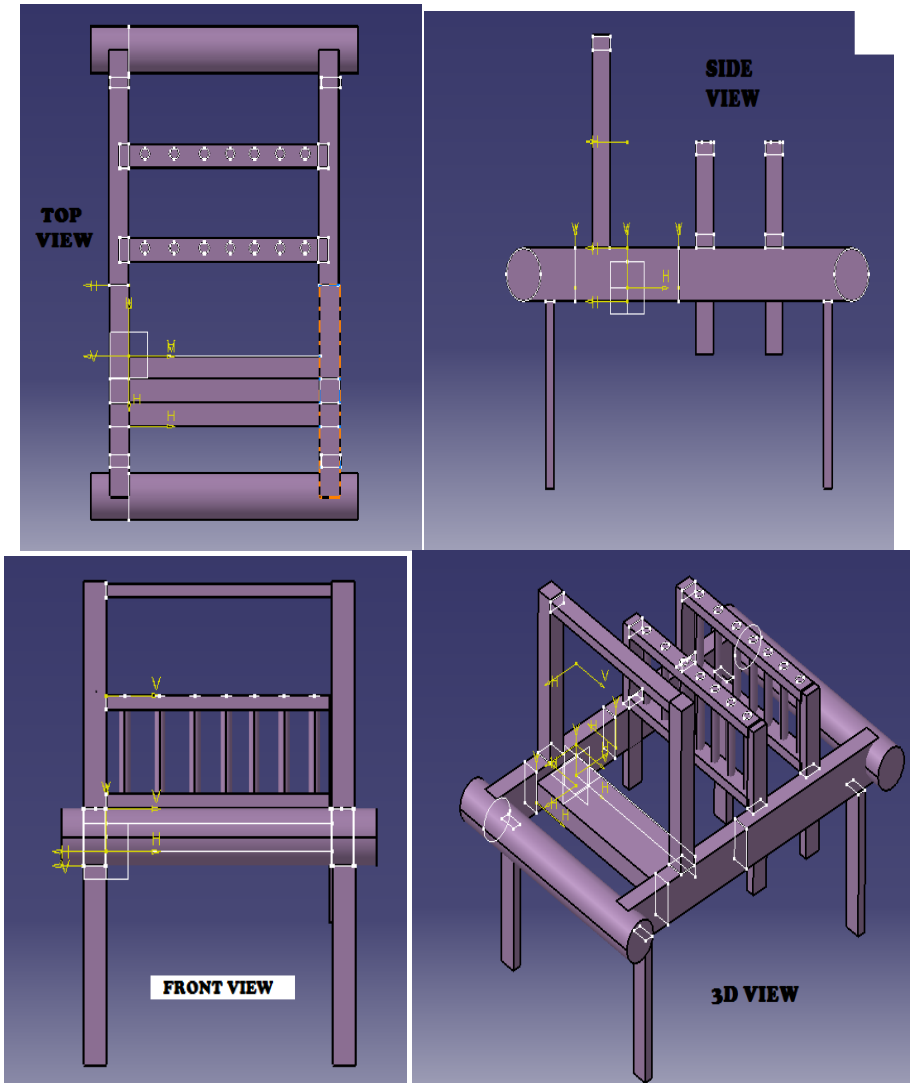
10. Treadle:
The treadle is a paddle or lever placed under a loom, here a thread is connected with the help of cords.

11. Temple:
It is the roller device on a loom that holds the cloth at a proper width.

Flow Chart of Weaving:

Yarn from spinning section
↓
Doubling and Twisting
↓
Winding
↓
Creeling
↓
Warping
↓
Sizing
↓
Winding on weavers beam
↓
Weaving

DESIGN OF MECHANICAL HANDLOOM



MECHANICAL HANDLOOM MACHINE

CALCULATION:

Mechanical Efficiency:
Output power /Power transmitted
Torque =F x r =mg.r =0.1x9.8x0.15 =0.147 Nm
Speed = 30 rpm
Power transmitted: P=2∏NT/60 = 0.5W
Velocity = 60cm/s = 0.6m/s
Output power = F x v =mv x v = 1 x 0.60 x 0.60 = 0.36 W
Efficiency = 0.36 / 0.5 = 0.72 = 72%

ADVANTAGES:

1)Mechanical efficiency is comparatively higher than conventional handloom.
2) Less human effort to operate the machine.
3)It has higher productivity.
4) It is free from pollution and eco-friendly.

CONCLUSION

The following modifications could be made in the handloom machine:

- The machine could be made to operate with a single input i.e., in the current set up the pedal movement is to be made using legs and loom is being operated with hands. This could be modified appropriately in the future.
- The usage of cams will simplify the structure and usage becomes simple.
- Productivity of the machine is greater than the handlooms but comparatively lesser than power looms. Appropriate modifications could be made so that the productivity of power loom.

The machine forms the transition between the basic low scale handloomers and the large scale power loomers. Bringing the power loom to the ordinary loom workers at the lowest price as possible has been our vision. As engineers, it is our duty to take into consideration all kind of people. Hence, with proper funding and proper shaping the most efficient handloom machine could be made available to the loom workers.

