

PADDY THRESHING MACHINE BY PEDAL AND AUTOMATED METHOD

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Abstract: Paddy is the most important and extensively grown food crop in the World. It is the staple food of more than 60 percent of the world population. Rice is mainly produced and consumed in the Asian region. India has the largest area under paddy in the world and ranks second in the production after China. With the increase in technology, it gives us a opportunity to develop agricultural equipment with latest technology having a DC motor and the transmission elements as required. The raw material is converted to finished product by various operations and treatments. The designed machine size is 50cm*50.25cm*60cm. By using the above designed machine, we obtain a increase of 5% in the efficiency per hour of operation. It also reduced the human effort by advance in the technology adopted.

Index Terms – Paddy threshing Machine, Automation,

I. INTRODUCTION

A Paddy threshing machine is a piece of farm equipment that threshes grain, removes the seeds from the stalks and husks. Before such machines were developed, threshing was done by hand with flails which was very laborious and time consuming. The first threshing machine was invented in 1786 by the Scottish engineer ANDREW MEIKLE, and the subsequent adoption of machines was one of the earlier examples of the mechanization of agriculture.

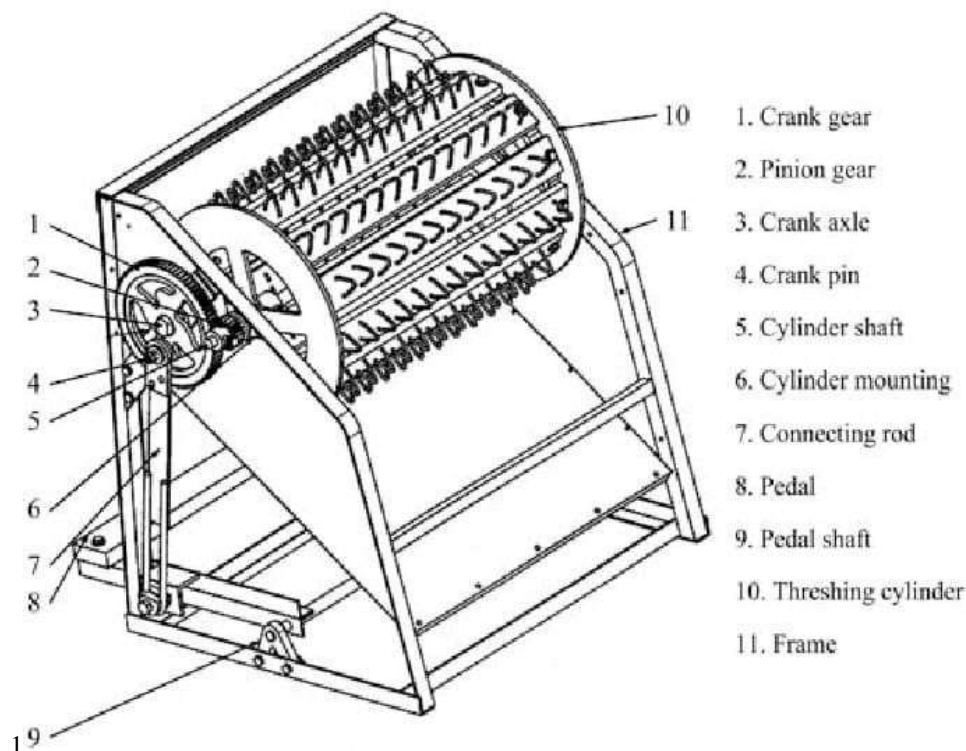


Fig1: First generated threshing machine

Paddy thresher of pedal operated type consists of mainly a well-balanced cylinder with a series of wire loops fixed on wooden slates. It has got gear drive mechanism to transmit power. While cylinder is kept in rotary motion at high speed, the paddy bundles of suitable sizes are applied to the teeth.

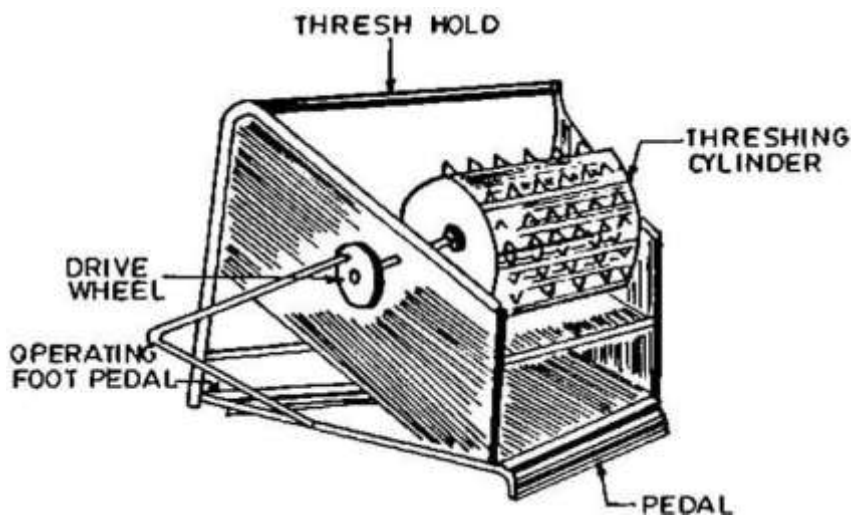


Fig 2 : Parts of A Thresher

The grains are separated by combining as well as by hammering action of threshing teeth. Paddy is threshed due to impact and rubbing action between threshing drawn loops and concave screen. The grains are cleaned with the help of a fan and cleaned grain goes down through the grain outlet at the bottom of the thresher. They are available in different horsepower range.



Fig 3: - Manual Operated Paddy Thresher

II. LITERATURE REVIEW

Mulyaqin T[1] – “Factors influencing the adoption of paddy threshing machine “Powered thresher.” The significant factors influencing a farmer to adopt a power thresher are farm size, the number of household members working on the farm, side job as farm labor, financial source and threshing costs. Farm size is found to have a significant and positive relationship with the probability of power thresher adoption at the 1% significance level. In contrast, the number of threshold members who are working on the farm and farmer who have side jobs as laborers has a significant and negative relationship with the probability of power thresher adoption at the 1% significance level. Minimizing costs is very important to maximizing profit. Threshing costs have a significant and negative relationship with the probability of power thresher adoption at the 1% significance level. The source of finance for paddy farming has a significant and positive relationship with the probability of power thresher adoption at the 5% significance level. As a conclusion, the empirical analysis shows the various factors that significantly influence the adoption of power threshers. Farm size, financial capability, and source of funds are the positive factors. Threshing costs and the high availability of labor are the negative factors.

Hemanth lit[2] – “Study and modification of rice threshing machine”. The author has done the modification of paddy threshing machine for automation in threshing. The author has been able to design and develop a automatic paddy threshing machine which

is operated conveyor belt. The motor used for conveyor is operated at 12V, 2 amps. The Shaft length is 3.25". The motor type is DC with torque 10A with a power of 120W. The motor used for cylinder rotating is Single Phase at a speed of 1440 rpm and 0.5HP with a body of rolled sheet. Conveyor belt is the main parameter of this system which is to give automation in paddy threshing and is operated on gear motor for required speed. This system reduces human effort, labor cost and time. It produced large amount of output compared to human labor

Abhijit khadatkar[3] – “Expenditure rate of threshing machine” The author has built a paddy thresher by considering various human parameters. They found out energy expenditure rate which was 19.34 kJ/min for older threshing machine and in their machine, it came out to be 17.71 kJ/min. The mean working hour was 141 beats per min in older machine and in their machine, it came out to be 51 beats per min. Reduction in human efforts was around 43% in their machine.

ADEWUMI ET AL[4] – “Threshing with hand driven machines.” Machines driven by a manual device are often used to improve yields and working conditions during threshing. By means of pedal, a big drum fitted with metal rings or teeth is made to rotate. The rice is threshed by hand handling the sheaves and pressing the panicles against the rotating drum. The hand-held sheaves must all be of the same length with the panicles against the rotating drum. The hand-held sheaves must all be of same length with the panicles all laid in the same direction, and the grains must be very ripe and dry. According to the author, the results of the performance analysis showed that threshing efficiency increased with an increase in cylinder and threshing efficiencies was found to be in the range of 54.5% to 100%. Depending on the type of machine, the skill of the workers and the organization of the work, yields can be estimated at a maximum of 100 kg/h.

Emmanuel B.K. Mutai [5]– “Design and fabrication of a Pedal Powered Paddy Thresher” The author has fabricated a paddy rice threshing machine was subjected to performance test and was found to thresh rice effectively. Grain losses and mechanical damages were found to be minimal and hence negligible. The machine threshes 90 kg of rice per hour. The thresher substantially reduces the human labor involved in threshing at an affordable cost and reduces the time used for threshing operation on small farms. The machine further reduces the post-harvest losses experienced in small scale rice growing field which is a bigger challenge in most of the developing countries. For ease the removal of the paddy grain of the stalk, threshing was efficient for rice with moisture content between 20% and 23%. Total power required by the machine was 84 watts operating at 400 rpm. This power is produced through human operated pedal mechanism. Performance test revealed that the efficiency of the machine was 92% with a through put of 90 kg per hour.

Clinton Emeka Okonkwo[6] – “Design, Development and Evaluation of a Tangential flow Paddy Thresher”. The traditional threshing of paddy is laborious, time-consuming, and cost-intensive and of low efficiency with high PL compared to the tangential thresher developed in the present study. The response surface modelling revealed the significant effect of the two threshing parameters MC (moisture content) and TDS (threshing drum speed) on performance efficiency of the developed tangential flow thresher. Within the range of this experiment, MC of the input was found to have the greatest impact on the performance efficiency of the developed thresher. Effect of MC on TR (threshing recovery), TE (Threshing Efficiency and PL (Percentage loss) were linear, but for the CE (Cleaning Efficiency) and PBG (Percentage blown grain) it was quadratic. The optimum operating condition was deduced to be 19.16% MC wet basis and 446 rpm.

Dagninet Amare[7]- “Development and Evaluation of Pedal Thresher for Threshing of Rice” The financial analysis showed that utilization of pedal and modified rice threshers has net benefit margin in the first year of investment. The promotion and utilization of the modified rice thresher reduces the threshing labor demand of an average farmer by 77.08%. Besides, farmers appreciated for home consumption and the avoidance of breakage used for thatching. However, they considered it as a low priority where weeding and planting are recently considered as major bottlenecks. However, inappropriate post-harvest handling including threshing results in physical loss of produce and the produce becomes low quality resulting in low market competitiveness and low income for farmers.

III. OBJECTIVES

The objectives of our project work are as follows:

- Design and development of a manual and automated integrated pedal operated paddy threshing machine.
- To develop a low cost and less human effort and increased threshing efficiency of paddy machine.

IV. METHODOLOGY

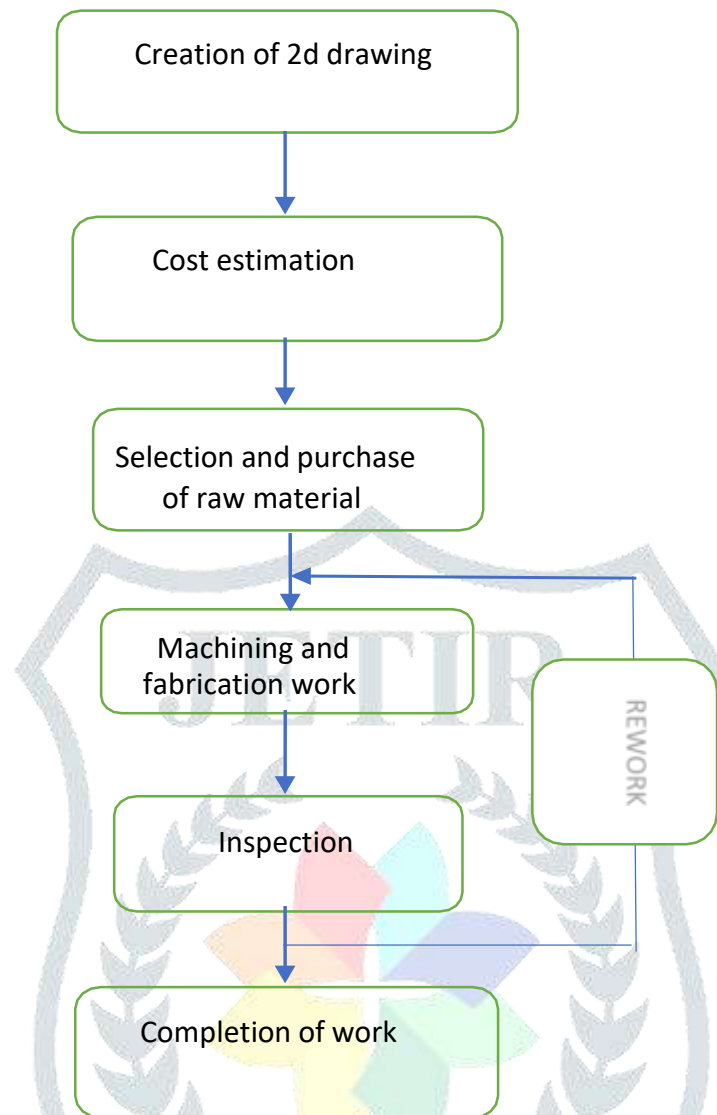


Fig.4 Methodology of Proposed project

The sequence of the work carried out is represented by a flow chart in Figure4. The project work commenced from identifying the problem followed by collecting the available relevant work through literature survey and with understanding the basics properties of paddy threshing machine and technology

V.EXPERIMENTAL WORK

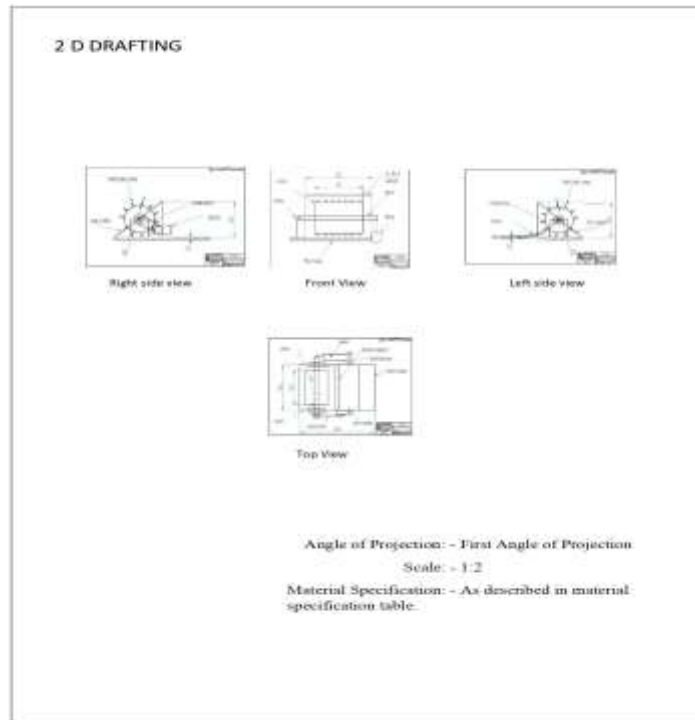


Fig 5. 2D Drawing of Paddy threshing Machine

The pedal or treadle thresher consists of threshing drum, base, transmission unit and a foot crank. When pedaled, the threshing drum rotates, and rice can be threshed when panicles are applied against the threshing drum. Because small straws, chaff, and foreign matter drop along with the threshed grain, whole grains must be separated using a flail, sieve or by winnowing. When the machine is in operation, firstly put the crops into machine from feeder. next crops will be rubbed squeezed, collided and shaken by the assembly of rack and screen mesh. Then the grain would be separated from the culm, and flow out from the screen mesh. Finally, the culm will be thrown out by centrifugation of roller, and threshing is finished

Materials specifications



Fig 6:Cutting of theSheet Metal



Fig 7:Threshing Roller



Fig 8:Motor



Fig 9:Bush

Sl no	Title	Specifications
1.	Main frame	1", 3mm L ANGLE
2.	SHEET METAL	16 G MS SHEET
3.	CENTRE SHAFT	16 G MS PIPE
4.	SHAFT BUSH MS BUSH	MS BUSH
5.	CHAIN DRIVE ASSEMBLY	STANDARD BICYCLE ASSEMBLY
6.	DC MOTOR	12V DC 40 Nm TORQUE
7.	SMPS POWER SUPPLY	12V DC 10 AMPS
8.	SIDE COVER SHEETS	9 mm PLYWOOD
9.	SPIKE THREADES SHAFT	8 mm THREAD RODS
10.	LATHE WORKS	BUSH BORING AND TURNING

6. RESULT AND DISCUSSIONS

- The paddy threshing machine design found to be 3.5% more efficient than the existing machine design due to a small change in blade angle by 2 degree .
- By using this machine, the efficiency of operation per hour increased by 4% than the regular one

7. CONCLUSION

The conclusions of the project review work are as follows:

- ❖ The design and fabrication of a paddy threshing machine was successfully carried out by this work.
- ❖ The threshing machine will reduce human effort and will be user friendly.
- ❖ It will accelerate the threshing process for our farmers.

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