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INDIGENOUS DEVELOPMENT OF LOW COST HARVESTING MACHINE

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ABSTRACT

Harvesting machinery is equipment used for harvesting the crop. There are many types of harvesting machines which are generally classified by crop. Harvesting machines are used for production of seed.This machine harvests grain crops. The total cost of machine can be manufactured at less cost. Frame stand has been fabricated by welding and joining the MS angle to the required dimensions. Rollers are fixed at an angle 60^0. Thresher and Hopper are fabricated and located at the left end of the machine. Cutting Blade is made and welded with a rod. Cam is fabricated and fixed with the rod which is attached to the Blade for linear movement. This innovation can rectify the hurdles of farmer's significantly. The new harvesting machine will reduce the harvesting cost by some percentage.

Keywords: harvest, low cost, crops, agriculture.

INTRODUCTION

It is the operation of cutting, picking, plucking digging or a combination of these operations for removing the crop from under the ground or above the ground and removing the useful part of fruits from plants.
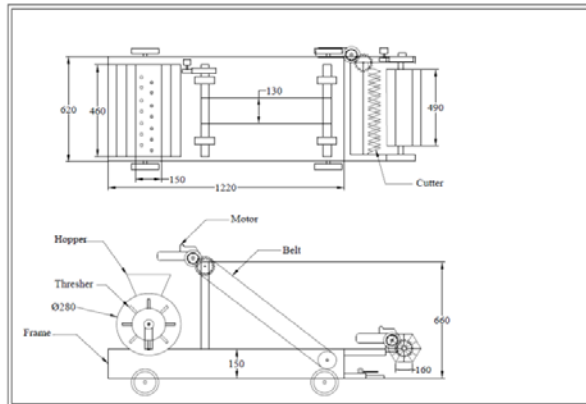

Figure-1. Outline drawing of harvesting machine.

Table-1. Bill of materials.

Components	Specification	Quantity
Roller	Mild Steel	2
Gear	Spur Gear/Cast Iron	2
Cam	Steel	1
Motor	40 RPM	1
Blade /Cutter	Stainless Steel	2
Conveyor Belt	Cotton or Fabric/flat belt	1
Thresher	Mild Steel	1
Collecting box	Mild steel	1
Battery	12v	1

Design of ball bearing
Bearing No. 6202
Outer Diameter of Bearing (D)   = 35 mm
Thickness of Bearing (B)   = 12 mm
Inner Diameter of the Bearing (d)   = 15 mm
r_1 = Corner radii on shaft and housing
r_1 = 1 (From design data book)
Maximum Speed = 14,000 rpm (From design data book)
Mean Diameter (d_m)   =   (D + d) / 2
                          =   (35 + 15) / 2
           d_m =   25 mm

Design of spur gear

Speeds in gear
Measured Specifications:
N_1/N_2 =   D2/D1
Where,
N_1 = Motor speed in RPM (40 RPM)
N_2 = Output speed
D_2 = Diameter of the roller gear wheel (100 mm)
D_1 = Diameter of the motor gear wheel (30 mm)
∴ N_2 = (D_1/D_2) x N_1
              = (30 / 100) x40
N_2 = 12 rpm

Working principle

Power is supplied to the machine through the 3V Battery. Battery operates the DC Motor in which 30w DC motor operates the cam; subsequently the blade is moving linearly (left and right direction). First, the header, described above, cuts the crop and feeds it into the threshing cylinder. This consists of a series of horizontal *rasp bars* fixed across the path of the crop and in the shape of a quarter cylinders. Moving rasp bars or rub bars pull the crop through concaved grates that separate the grain and chaff from the straw. The grain heads fall through the fixed concaves what happens next is dependent on the type of combine in question. In most modern low cost harvesting augers, set parallel or semi-parallel to the rotor on axial mounted rotors and perpendicular to the cylinder on conventional (or perpendicular to the cross mounted

rotor of Gleaner brand "Natural Flow" combines.) In older Gleaner machines, these augers were not present.

Cost estimation

Fabricating material Cost in Rupees = Rs 2600 /-
Material cost in Rupees = Purchased parts + Fabricating material cost

$$= \text{Rs } 10400 + \text{Rs } 2600$$
$$= \text{Rs } 13000 \text{ /-}$$

Labor cost in Rupees   = Rs 2400 /-
Transport charges in Rupees   = Rs 1500 /-

Overhead charges

The overhead charges are arrived by "Manufacturing cost"
Manufacturing Cost in Rupees   = Material Cost + Labor cost
$$= \text{Rs.} 13000 + \text{Rs } 2400$$
$$= \text{Rs } 15400 \text{ /-}$$

Figure-2. Photographic view.

CONCLUSIONS

This low Cost Harvesting Machine works with acceptable conditions. This machine is easily fabricated in any fabrication shop. The spare of this machine is easily available in market. Spare parts of this machine are not expensive. Farmers can reduce the harvesting cost and time of harvesting easily. The machine will reduce the labor problem and find of labor in harvesting easily and the machine will serve a great deal for small scale labor farmers

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