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Fabrication of Multicrop Cutter

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ABSTRACT: This paper addresses the development and performance of human powered multi crop cutter. We have developed a mechanism for harvesting of crop cutter so that we can an easy harvesting in minimum period of time. This set up is used to cut the crop which helps formers. Also this set up uses the manpower of labor by pushing force which is provided with different sprocket, chain, rubber wheel to metal wheel and bevel gear mechanisms which results in transmission of this manual motion into rotary motion of cutter at the end of which the crops get cut easily without any hard effect.

KEYWORDS: Harvesting, Transmission, Human powered, Rotary motion.

I. INTRODUCTION

In the country like India where the main source of income is agriculture. Needs to concentrate in some aspects like how to increase productivity and profit, how to reduce cost and how to solve and ease the problems of workers. To overcome this a new manually operated cutter is fabricated for cutting of multiple types of crop during harvesting and named as 'Multi Crop Cutter'. It possesses four criterion ease in manufacturing, ease in handling, low cost and light weight. There are some procedures involved in fabrication of this device such as fabricating prototypes, material & component selection, etc.

Today, India ranks second among other countries across the globe in farm output. Agriculture and allied sectors like forestry and fisheries accounted for 13.7% of the GDP in 2013, about 50% of the workforce. The economic contribution of agriculture to India's GDP is steadily decreasing with the country's broad-based economic growth. Still, agriculture is a demographically broad economic sector and plays a important role in the overall socio-economic fabric of India. According to WHO, Slow agricultural growth is a interest for policymakers as two-thirds of India's people depend on rural employment for a living. The agricultural practices which are currently employed are neither economically nor environmentally sustainable and India's yields for many agricultural material are comparatively low. Improperly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation.

II. LITERATURE REVIEW

Crop cutting machine is more important for the maintenance of farms. The power source of riding movers for example are powered by engine (gasoline) and are ridden and steered by the operator. It is designed in such a way that the operator pushes the machine from behind and typically run on gasoline or electricity. Modern gas and electric powered lawn movers cuts grass with a single blade rotating at a high speed parallel to the ground. Mulch movers suspends clippings and other debris near the blade shredding them before blowing them straight down in the lawn where they serve for lawn growth. Koori, (2010) designed a operated engine powered crop cutter. The machine is fitted with horizontal blade attached to a vertical shaft. The machine was tested ,the efficiency and average effective field capacity were 88.4% and 0.127 ha/hr respectively. Jeremy, In 2005 designed and fabricated solar charged cutter machine. The machine was dependent on weather since the battery would be charged using solar panel. The common drawback was that the engine runs slowly and the production cost was high for an average individual to purchase. Until engines were small enough and powerful enough to run the blades at a high speed ,rotary movers were not developed. people experimented with rotary blades in the late 1930s and early 1940s, and Power Specialties Ltd. introduced a gasoline powered rotary mover. His concept was the use of a toothed circular saw blade mounted

horizontally on a vertical shaft, which would be suspended at a height of 2 inches (50 mm) and moved across a lawn to cut grass and other lawn at a uniform height. The power for his experimental mower was an electric motor. The success of Stacy's design was limited by two factors: the relatively small diameter of the saw blades he used for his experiments, which were about 8 inches (200mm); and the fact that toothed circular saw blades are not an ideal tool for cutting freestanding grass and other plants. Stacy did not come up with any idea for a cutter similar to modern rotary mower straight blades, and soon dropped his experiments with rotary mowing. Ballads developed this into what he called the "Weed Eater", since it eaten up the grass and weeds around trees. Victor and Vern's, (2003) designed and developed a power operated rotary weedier for wet land paddy. The complex nature of the machine makes its maintenance and operation difficult for the peasant farmers.

Generally, in India, the conventional methods of crop cutting involved the use of cutlasses which satisfies to max. More so, it is complicated, time and labour intensive. In world the usage of agriculture equipment is increasing. In the usage of agriculture tool's, India contributes only 16% as Conducted survey in year 2011. two types of cutting methods generally available are 1. Manual method 2. Mechanized type of harvesting In Manual Harvesting to cut one acre of crop

With reference to literature available there are many types of crop, bushcutters and lawn tractors are exist in the market, which may not fulfill the capital andoperational cost criteria. The top concentration of our design is the cost and operational ease in case small form units it is very costly, so we decide to develop the newharvesting machine to reduce the cost of harvesting. We start research on the cuttingmethods and machines. In the development of ultra-portable crop cutter we utilize the pastdata and techniques. Therefore, there is the need to develop a locally, fabricated Multiple CropCutter.

III.MULTI CROP CUTTER WORK LAYOUT

The work layout shows the arrangement of various parts of project. It consists of different parts including three wheels, sprocket, freewheel ,two bevel gear mechanism , two cutters,etc. For easy analysis and study of these arrangements, we classified it into three sections as follows: (1) chassis arrangement (2) Power transmission arrangement (3) Cutting arrangement

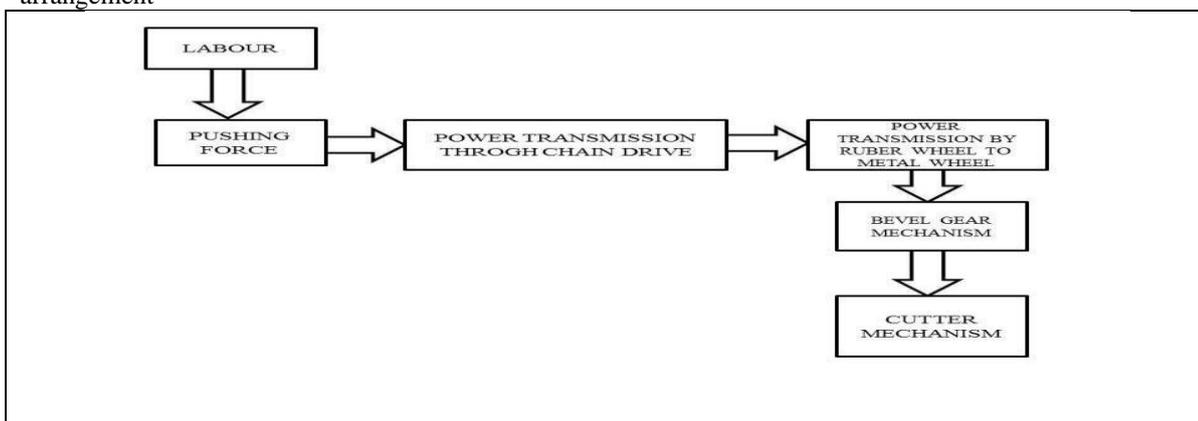


Fig1 : Working layout of practical arrangement

The above three sections of this project can easily describe the project function. The input is given to the pushing force of labour to the handling .The output of 1st section is then given to the input of power transmission section which includes 1st shaft having sprocket. Then the output of the power to the 2nd shaft having freewheel and a cycle wheel transfer power to the 3rd shaft having metal wheel, two bevel gear arrangement is attached to the end of 3rd shaft and which is power transmit to the cutter mechanism

A) Practical Arrangement Of Different Sections

1. Chassis arrangement section

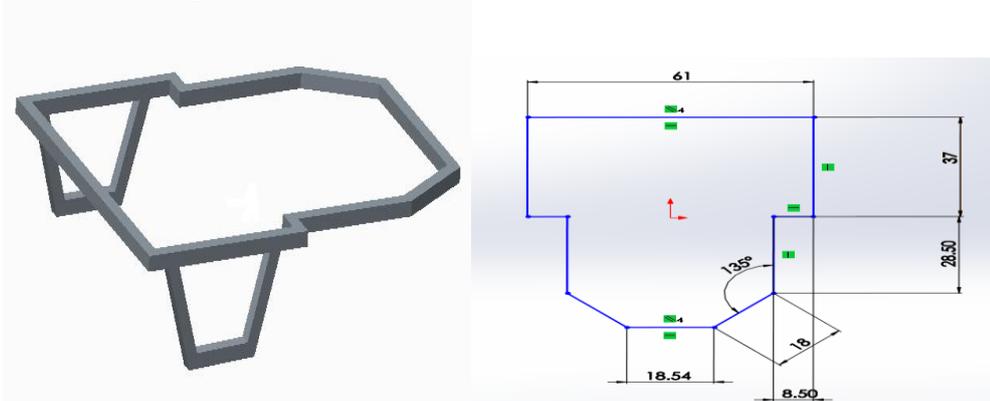


Fig 2: chassis arrangement

This is the first and very important part of this arrangement. It consists of a simple structure like shown in above fig. The comfortness of handling of work depends on this section. This arrangement of structure is fitted on the span of base at both end having two wheels and at front end with a wheel.

2. Power transmission system



Fig 3: Power transmission system

The chain drive is the another part of this arrangement. The figure is shown above. Rubber wheel to metal wheel power transmission.

Gear mechanism: the bevel gear mechanism which shown in fig below at right angle having teeth ratio 1:1.8.

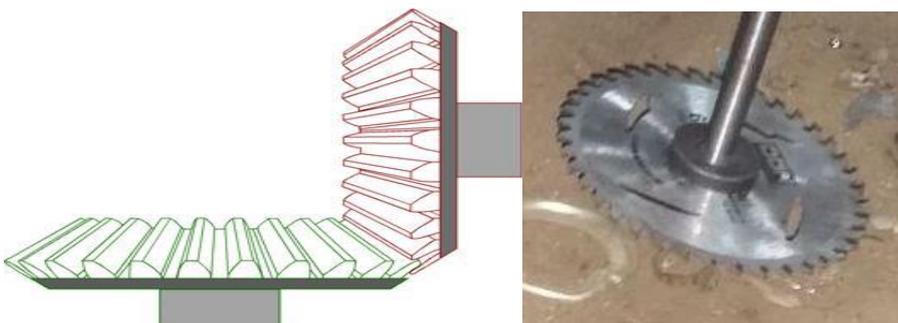


Fig 4: Bevel gear arrangement

Fig 5: cutter

3. Cutter Mechanism

The cutter assembly is an essential parameter because the main output of mechanism mainly depends on the cutter mechanism components.

Blade:The cutter blade is the cutting device which is having cutting teeth on its periphery. For the toughness of cutting mechanism, they may use tip of carbide metal. We use the blade of stainless steel of having diameter of 150 mm and no. of teeth is 40.

IV. WORKING PRINCIPLE

When the worker will push machine with the handle then wheels starts rotating. This rotation of wheels is transmitted to the shaft. On this shaft the sprocket is mounted having chain drive with 2nd shaft having freewheel and cycle wheel which transfer the rotation to the 3rd shaft .On this shaft the bevel gear is attached to both the ends then with the help of bevel gears this rotation is transmitted to vertical shaft having cutter at the end. Due to the teeth ratio of bevel gears, rotation is maintain and power is obtained for cutting purpose.

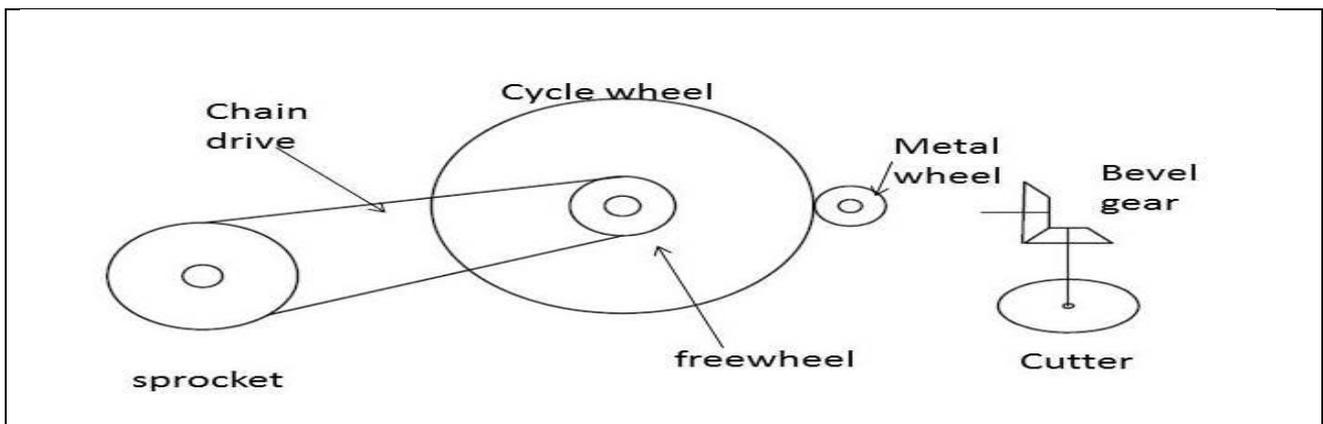


Fig 6: Working Principle schematic

V. SPECIFICATION OF MULTICROP CUTTER MACHINE

Weight of machine = 40 kg.
 Power supplied = 104.71 watt
 Power transmitted = 73.43 watt
 Speed of blades = 1080 RPM

Sr. no.	Name of components	Dimensions	Material
1.	Three wheels	Diameter =14 inch	Mild steel
2.	Cycle wheel	Diameter = 20 inch	Stainless steel
3.	Sprocket	Diameter =8 inch Teeth = 48	Mild steel
4.	Freewheel	Diameter = 2.75 inch , Teeth = 16	Mild steel
5.	Metal Wheel	Diameter = 2 inch	Cast iron
6.	Bevel gear	Large, diameter = 2.125 inch Teeth = 18 Small, Diameter = 1.25 inch	Mild steel

		Teeth = 10	
7.	Cutter	Diameter = 6 inch Teeth = 40	Stainless Steel

VI.MACHINING PROCESS FOR FABRICATION OF MULTICROP CUTTER MACHINE

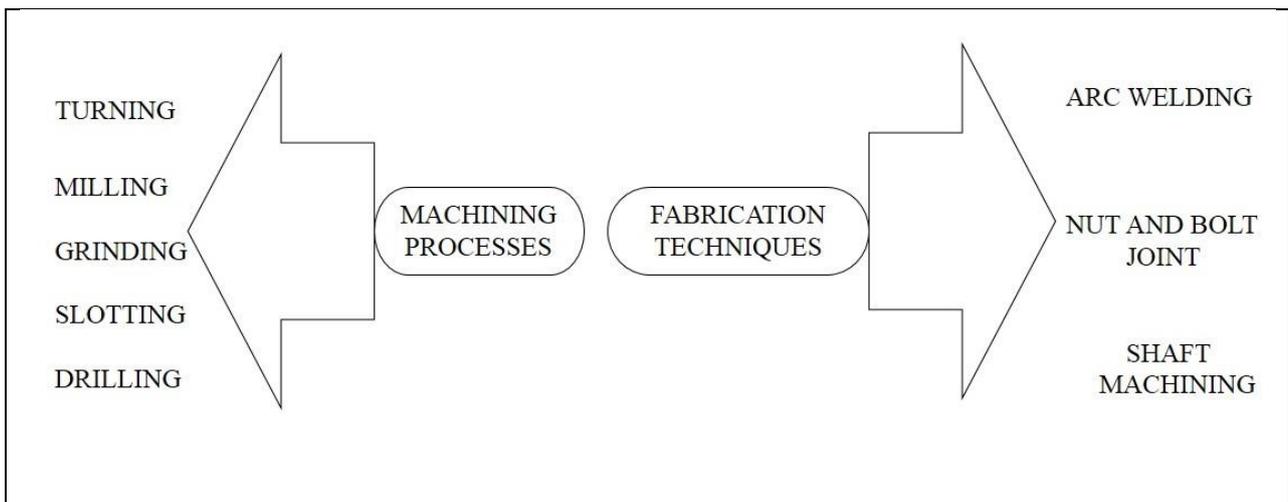


Fig 7: Block diagram of machining processes and fabrication techniques

Fabrication is the process of making the machine or structure by using the various machining methods and fabrication techniques.

Turning is used to reduce the radius of the work piece, usually to a specified dimension, and to produce a smooth finish on the metal. Milling can be done with a broad range of machine tools. The original class of machine tools for milling was the milling machine (often called a mill). Grinding is used to finish work pieces that must show high surface quality (e.g., low surface roughness) and high accuracy of shape and dimension. Drilling is machining method is used to produce the circular holes in the machining component, to produce the holes in jobs various drill bits are used. A machine tool with a vertically reciprocating planing tool used for making a mortise or shaping the sides of an aperture. Welding is a fabrication or sculptural process that joins materials, usually metals. There are also special-purpose closing devices, nuts and bolts. For the drive shaft we choose the EN8 (medium carbon steel) material, it is economical and having the required strength for the equipment.



Fig 8: Final assembly of Multi crop machine



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VII. CONCLUSION

The Multi crop cutter is designed, fabricated and tested. This machine does not employ any use of power equipments such as DC motors and it is fully human operated. The use of this machine makes the harvesting process faster hence reduce most of the cutting time and labour required to operate the machine is also less. This machine is helpful for small as well as big farms. This human powered machine will help to improve an economical condition. This is new type of machine which is different to the other cutting machine which are used for harvesting purpose till now.

REFERENCES

- [1] P. K. Verma "Users compendium on small agriculture machinery and equipment's".
- [2] Abdul Shakoor khan and M Salim "Rice harvesting and threshing" PAK J FOOD SCI, 12(1-2): 45-52.
- [3] P.B. Khope, J.P. Modak "Development and performance evaluation of a human powered flywheel motor operated forge cutter" ISSN 2277-8616.
- [4] A.K. Pitale, P.A. Hatwalne "A review on – Flywheel motor" ISSN: 2319-5967
- [5] Shutter Bugger "Pedal powered battery charger"
- [6] David Butcher "Pedal power generator- Electricity from exercise"
- [7] David Gordon Wilson. Technical Reviewers, Understanding Pedal Power. Volunteers in Technical Assistance (VITA), Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740-741.
- [8] Zakiuddin K.S., Modak J.P. 2010. Design and Development of the Human Energized Chaff Cutter. New York Science Journal.