Design And Fabrication of Pedal Operated Multi Crop Cutter

C. Mohan Naidu
Associate Professor, HOD Dept of Mechanical Engineering
Sri Krishnadevaraya Engineering College, Gooty, A.P, INDIA

Abstract- *This title presents the concept for design and fabrication of pedal operated multi crop cutter. The crop cutting is important stage in agriculture field. Currently in India former used conventional method for crop cutting i.e. the conventional method for crop cutting is as manually cutting using labour but this method is lengthy and time consuming. This project aim is to design and analysis of small field crop cutter machine for small height and small steam crop. It helps to reduce farmer's effort and to increase rate of cutting crop. The machine consist of different mechanisms are used in this machine. When compare to manual crop cutting by using this machine has a capacity to cut the crop in faster rate. This machine is helpful for both the small as well as big farm. This machine is used by poor farmers which are not capable to buy Harvester machine, Ripper binder machine, etc. because of high cost.*

Keywords- Manual method, Mechanized method, Peak working, Crop cutting.

I. INTRODUCTION

Agriculture is the backbone of India. In India agriculture has facing serious challenges like scarcity of agricultural labour, in peak working seasons but also in normal time. This is mainly for increased nonfarm job opportunities having higher wage, migration of labour force to cities and low status of agricultural labours in the society. In India two type of crop cutting like as manual method (conventional method) and mechanized type of crop cutter. The crop cutting is important stage in agriculture field. Currently Indian former used conventional method for crop cutting i.e. cutting crop manually using labour but this method is very lengthy and time consuming.

Fig 1.Conventional method of crop cutting

To design and analysis of the crop cutter machine which helps to the Indian farmer which is in rural side and small farm .It will reduce the cost of crop cutting in field. It will help to increase economical standard in Indian farmer. The design of the crop cutting machine will be presented by using Pro/E software.

Recently rural has seen a shortage of skilled labour available for agriculture. Because of this shortage the farmers have transitioned to using harvesters. These harvesters are available for purchase but they are not affordable due to their high costs however, agriculture groups make these available for rent on an hourly basis. But the small holding farm owners i.e. generally having land less than 2 Acers generally do not require the full-featured combine harvesters. Due to financial or transportation reasons these combine harvesters are not available in all parts of rural area. Thus, there is a need for a smaller and efficient combine harvester which would be considerably cheaper and also more accessible. The mission is to create a portable, low cost, mini harvester and user-friendly. These problems gave us the basic idea about what was required in the current situation. The idea was to create a machine which will reduce the labour required to harvest crops and which is cheap. This machine has the capability and the economic value for fulfilling the needs of farmers having small land holdings which is less than 2 acres. This machine is cost effective and also easy to maintain and repair for farmers.
Today, India ranks second among other countries across the world in farming output. Agriculture and allied sectors like fisheries and forestry accounted for 13.7% of the GDP in 2013, about 50% of the workforce. The economic contribution of agriculture to India's GDP is decreasing steadily with the country's broad-based economic growth. According to WHO (world health organization), Slow agricultural growth is a interest for policymakers as 2/3 of India's people depend on rural employment for a living.

The history of agriculture in India dates back to the *Rugveda*, written about 1100 BC. . In world the use of agriculture equipment is increasing. India uses only 10% agricultural equipment's as Conducted survey in year2012.
Still as per the 2010 FAO world agriculture record, of wheat and rice, this is the world major food. India has ranked

between five largest producers over 80% of agricultural produce items. All countries used wide range of technology for production of crops including soil cultivation, and cutting of crops, and the activities of proper processing and marketing. Many different factors influence the kind of agriculture practiced in a particular area. It differs from climate, soil fertility, availability for near market place.

The first agricultural products consist of crop plants for human food and animal feed and waste products from crops. Crop cutting machine is an essential tool. They are different in size, way of operation, and power. The power source for such machine is usually gasoline engine and can ride by skilled operator. Modern gas powered and electric powered lawn grass cutters cut grass with a single blade revolving at a high speed parallel to the ground. This blade is slightly raised from its rear edge to create draft that lifts the cutting blades before its cutting operation. Reduce the cost on the harvesting method.

In this project, the instrument called multi crop cutter is developed to help small-scale farmers to fulfill demand and supply for market, it cut the crop more easily. The aim is for focus on easy cutting operation of the small land holders for cutting varieties of crop in less time and at low cost by considering different factors as power requirement, cost of equipment , ease of operation , field condition , time of operation and climatologically conditions. This is very cheap in cost but used the electricity is not profit getting factor. So therefore we design and fabricate the multi crop cutter. For multi crop cutter no need for electricity, because it is manually operated it is operated on the basis of gear mechanism.

Harvesting

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.

Harvesting action can be done by four ways

1. Slicing action with a sharp tool.
2. Tearing action with a rough serrated edge.
3. High velocity single element impact with sharp or dull edge.
4. Two elements scissors type action.

PROPOSED SYSTEM

Field Survey

Present method of Crop cuttings important stage in agriculture field. Currently Indian former used conventional method.

- Manual methods of crop cutter.
- Crop cutting by using mechanized.

Manual method of crop cutting

The cutting and threshing machine for seed separation this method the crop are remove as mentioned in the traditional method. These method crops are tied together to form a bundle. These bundles are garnered and taken to threshing machine. This machine separates the seed from the crops.

The most common method for harvesting rice in Asia is the manual system by hand. The rice crop is cut using simple hand tools: sickles cutting 15-25 cm above ground level, or hand-held knives to cut just below the panicle. The harvested crop is sometimes bundled to improve handling and transport. The manual system of harvesting is very effective in lodged crop conditions, however it is labour intensive. Manual harvesting requires 40 to 80 person-hours per ha. It will take additional labour to collect the harvested crop.

Fig. Manual method of crop cutting

Combine crop cutting machine

The combination of crop cutting machine is to combine the three operations like as cutting, reaping and winnowing into single process. It is combination of crop cutting machine most of the economically labour saving. It is machine designed for harvesting threshing, separating, cleaning and collecting grains while moving through the standing crops. Bagging arrangement may be provided with a pick up attachment, it may be self propelled or tractor operated.

Fig. combine harvester –thresher(2D view)


Fig. combine harvester –thresher

The main function of a combine is:

- Cutting the standing crops
- Feeding the cut crops to threshing unit
- Threshing the crops
- Cleaning the grains from straw
- Collecting the grains in a container.

Classification of Crop Cutting Machines:

1. Cover crop cutting

Cover crops are, by definition, left on and in the soil rather than moved to the compost heap. With some (like rye), you do have to wait a couple of weeks before planting into them, but with others (like buckwheat) there's no need to wait. Sitting on the soil surface, only those with a very high C:N will steal nitrogen from the soil (as opposed to if you tilled them in, in which case all would steal nitrogen for at least a short time.) That's the problem you could see, not that they'd cause seeds to rot.

The basic idea of cover crops is that you grow humus during gaps in the garden year when the beds would otherwise be fallow, and in the meantime you keep weeds from taking over that garden bed. If done right, it's a win-win. Of course, you'll still want to add other compost to the bed, but the cover crops help.

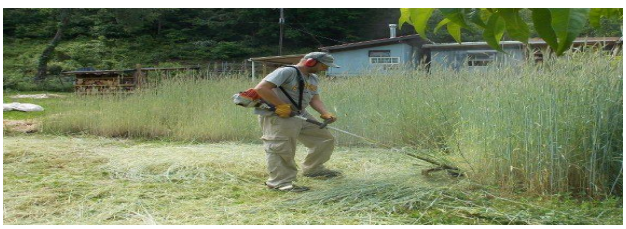


Fig. cover crop cutting method

2. Row crop cutter and conveyor

Accordingly, it is an object of the present invention to provide a row crop harvesting apparatus which automatically cuts and conveys a single row of crops. It is another object of the present invention to provide a row crop harvesting apparatus for cutting and conveying row crops without damaging the produce attached thereto. Still another object of the present invention is to provide a row crop harvesting apparatus which increases row crop harvesting efficiency. These and other objects of the invention will become apparent upon reference to the following specification, drawings, and claims.

By the present invention, it is proposed to overcome the difficulties encountered heretofore. To this end, a harvesting apparatus for row crops having stalks and produce is provided. The apparatus is capable of cutting the stalks and conveying the row crops to a processing point without substantial damage to the produce. The apparatus comprises a frame having a front and a back, as well as a cutter connected near the front of the frame, the cutter which is capable of cutting the stalks of the row crops.

At least one guide is connected near the front of the frame and in front of the cutter, the guide which is capable of directing the row crops into the cutter. Means are connected to the frame for receiving and conveying the produce to the processing point. Means are also connected to the frame for engaging the stalks separately from the produce and conveying the stalks to the processing point. The stalk engaging and conveying means are capable of conveying the stalks in a manner which substantially prevents contact of the stalk engaging and conveying means with the produce.


Fig. row crop cutter and conveyor

3. Root crop haulm cutter

It is appropriate to make the root crop haulm cutter such that the blades of one auger overlap with those of the other by a value greater than the clearance between the nearest surfaces of the blades of the coupled augers.

Due to this the recess between the augers of the pair is not deep and passage of the root towards the augers terminates before the root head contacts the surface of the rotating augers. This prevents the root heads from being damaged by the screw blades of the augers.

Additionally, it is appropriate to provide sharp edges for the screw blades of the augers adjoining the cutting edge of the immovable knife whereas the blade edges throughout the remaining length of the augers should smoothly blend into a rounded or oval shape. V

The oval shape of the edges of the auger screw blades at the zone of haulm entry and dragging of root crops makes it possible to decrease the distance between the root head and the plane of cutting the haulm and ensures better levelling of the root crops as to the height of their heads prior to the haulm cutting. Sharp edges of the auger blades atthe zone where they slide along the cutting edge of the immovable knife during the augers rotation facilitates the process of haulm cutting between the two adjoining and mutually sliding edges of which belongs to the immovable knife and the other to the rotating screw blades of the augers.

The cutting edge of the immovable knife can be made biconcave in the direction of the auger axes.

The cutting edge of the immovable knife having a biconcave shape curved in the direction of the auger axes makes it possible to increase the length of those sectors of the auger blades which, during the rotation of the augers, slide along the cutting edge of the immovable knife, and, therefore, for ticipate in the process of haulm cutting. Thanks to this, the load on each point of the sharp edges of the auger blades is decreased and substantially prolongs the service life of the cutter prior to repair.

Such a design of the root crop haulm cutter makes it possible to employ the same in root crop harvesters to harvest table root crops, as to well as harvest commercial quality products without resorting to manual labour.

Fig. Root crop haulm cutter

4. Sickel bar cutter

A sickle bar cutter assembly for use on crop harvesting machines includes a mechanism for automatically adjusting the relationship of the cutter hold downs to the cutter knives to ensure that proper scissors action of the cutter knives produces a clean cut of the crop being harvested. The mechanism includes a member for biasing the cutter hold downs against the cutter knives and a member to which the cutter hold down is mounted and about which it pivots. At least those portions of the cutter hold downs contacting the cutter knives are hardened.

Typically, in previously known sickle bar cutters, the reciprocating cutter blades were held in place against the cutter knife guards by a hold down clamp which was firmly fastened to a mounting bar. The hold down was fitted with an adjusting mechanism to enable the proper spacing to be achieved between the hold down and the reciprocating cutter blades such that proper shearing of the crops occurs. However, it will be appreciated that frequent adjustments between the hold downs and the reciprocating cutters were necessary as the wearing action caused by the continual back-and-forth movement of the cutter blades against the stationary hold downs tended to wear, and thereby alter, the preset spacing between the two. It was then necessary for the operator of the equipment to manually readjust the spacing to the prescribed acceptable tolerances. This was, and still is, a time consuming and tedious procedure resulting in an unacceptable period of down time for the harvester. Of course, if the adjusting procedure became necessary while crops were being harvested, it could result in the farmer's inability to complete the harvest due to, for example, a change in weather conditions. Additionally, while the equipment is being serviced, the farmer, who in many instances is the person responsible for maintenance, would not be available to perform required other tasks.

Fig. sickle bar cutter

II. PROBLEM STATEMENT

Paddy and Wheat is one of the new targets in agriculture where still not much researchers and manufactures participate in this field. From that there are some problems

arise such as how to maximizing the profit, how to increase productivity and how to reduce the cost. One of the important activities in Paddy and Wheat is harvesting.

This harvesting operation requires 50% of the investment on the particular crop goes to harvesting the crop and its transportation due to increase in wages of the labour and reduce in availability of labour leading to the high demand of the labour. So the ideas to reduce the dependent on workers in this harvesting, this project comes to solve all this problems where the new invention for machinery in harvesting which able to reduce the workers. By using the tools like machinery, the dependent on the worker can be reduce, productivity can be increase, the cost can be reduce and the profit can be increase. From that, the main objective for this project is to design and fabricate the prototype of a motorized cutter to harvest crop for commercial used can achieve.

This is the theoretical and systematic analysis of the methods applied to a study or to the theoretical analysis of the principles and method associated with branch of study. This study is to design and fabricate the machinery which can reduce dependency on workers which give much effect to our country in increasing the profits for the farmers. To design and fabricate this machine, there are many criterion are selected such as easy to manufacture, low cost in long term, and can harvest high and with much easy to use .

The fabrication of any machine demands sufficient and proper planning while selection of systematic process. Normally, the fabrication is carried out after the design process. Once the required dimension obtained then the only work remains and that is to convert the calculated dimensions into actual fabricated model. It is the common that any new concept which is being evolved it needs to be verified to check its performed physical dimensions.

1. Studying the present mechanisms.
2. To identifying the potential problem.
3. Problem definition.
4. Literature review.
5. Design of crop cutter.
7. Calculation.
8. Fabrication.

III. INTRODUCTION TO Pro/E

PRO/E is the industry's de facto standard 3D mechanical design suit. It is the world's leading **CAD/CAM /CAE** software, gives a broad range of integrated solutions to cover all aspects of product design and manufacturing. Much of its success can be attributed to its technology which spurs its customer's to more quickly and consistently innovate a new robust, parametric, feature based model. Because that ***PRO/E*** is unmatched in this field, in all processes, in all countries, in all kind of companies along the supply chains.***PRO/E*** is also the perfect solution for the manufacturing enterprise, with associative applications, robust responsiveness and web connectivity that make it the ideal flexible engineering solution to accelerate innovations. ***PRO/E*** provides easy to use solution tailored to the needs of small medium sized enterprises as well as large industrial corporations in all industries, consumer goods, fabrications and assembly. Electrical and electronics goods, automotive, aerospace, shipbuilding and plant design. It is user friendly solid and surface modeling can be done easily.

MODAL IS DRAWN:

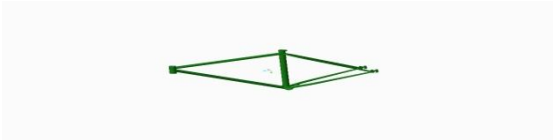


Fig. cycle frame (chassis)

Fig. seat

Fig. Handel supporter

Fig. Handel bar

Fig. Fork

Fig Back Wheel

Fig. Front Wheels Fork

Fig. Front wheel shaft

Fig. Front wheels

Fig. Bevel Gear

Fig. blade supporting setup

Fig. Yolk mechanism setup

Fig. Crop cutting blades

Fig Final constriction of product

IV. COMPONENTS AND DESCRIPTION

The pedal operated crop cutter contains following components

- Pedal system (bicycle)
- Beal gears
- pedestal bearing
- Yoke mechanism
- Crop cutting blades

Bicycle:

A bicycle, also called a cycle or bike, is a human-powered, pedal-driven, single-track vehicle, having two wheels attached to a frame, one behind the other. A bicycle rider is called a cyclist, or bicyclist.

Bicycles were introduced in the late 19th century in Europe, and by the early 21st century, more than 1 billion have been produced worldwide. These numbers far exceed the number of cars, both in total and ranked by the number of individual models produced. They are the principal means of transportation in many regions. They also provide a popular form of recreation, and have been adapted for use as children's toys, general fitness, military and police applications, courier services, bicycle racing and bicycle stunts.

The basic shape and configuration of a typical upright or "safety bicycle", has changed little since the first chain-driven model was developed around 1885. But many details have been improved, especially since the advent of modern materials and computer-aided design. These have allowed for a proliferation of specialized designs for many types of cycling.

The bicycle's invention has had an enormous effect on society, both in terms of culture and of advancing modern industrial methods. Several components that eventually played a key role in the development of the automobile were initially invented for use in the bicycle, including ball bearings, pneumatic tires, chain-driven sprockets and tension-spooked wheels.

GEARS:

A **gear** or **cogwheel** is a rotating machine part having cut *teeth*, or cogs, which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine. The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are

called a gear train or a *transmission.* A gear can mesh with a linear toothed part, called a rack, thereby producing translation instead of rotation.

The gears in a transmission are analogous to the wheels in a crossed, belt pulley system. An advantage of gears is that the teeth of a gear prevent slippage.

When two gears mesh, if one gear is bigger than the other, a mechanical advantage is produced, with the rotational speeds, and the torques, of the two gears differing in proportion to their diameters.

In transmissions with multiple gear ratios such as bicycles, motorcycles, and cars the term "gear" as in "first gear" refers to a gear ratio rather than an actual physical gear. The term describes similar devices, even when the gear ratio is continuous rather than discrete, or when the device does not actually contain gears, as in a continuously variable transmission.

Types of gears:

1. Spur Gear
2. Helical Gear
3. Herringbone Gear
4. Bevel Gear
5. Worm Gear
6. Rack and Pinion
7. Internal and External Gear
8. Face Gear
9. Sprockets

Bevel Gear:

Bevel/Miter Gear-Intersecting but coplanar shafts connected by gears are called bevel gears. This arrangement is known as bevel gearing. Straight bevel gears can be used on shafts at any angle, but right angle is the most common. Bevel Gears have conical blanks. The teeth of straight bevel gears are tapered in both thickness and tooth height.

Spiral Bevel gears: In these Spiral Bevel gears, the teeth are oblique. Spiral Bevel gears are quieter and can take up more loads as compared to straight bevel gears.

Fig. spiral bevel gears

Zero Bevel gears: Zero Bevel gears are similar to straight bevel gears, but their teeth are curved lengthwise. These curved teeth of zero bevel gears are arranged in a manner that the effective spiral angle is zero.

Fig: Zero bevel gears

Worm Gear: Worm gears are used to transmit power at 90° and where high reductions are required. The axes of worm gears shafts cross in space. The shafts of worm gears lie in parallel planes and may be skewed at any angle between zero and a right angle. In worm gears, one gear has screw threads. Due to this, worm gears are quiet, vibration free and give a smooth output. Worm gears and worm gear shafts are almost invariably at right angles.

Fig. Worm gear

BEARINGS:

There are numerous different kinds of bearings that are designed to handle radial load, thrust load, or some combination of the two. Because different applications require bearings that are designed to handle a specific kind of load and different amounts of weight, the differences between types of bearings concern load type and ability to handle weight.

- **Ball Bearings**

Ball bearings are extremely common because they can handle both radial and thrust loads, but can only handle a small amount of weight. They are found in a wide array of applications, such as roller blades and even hard drives, but are prone to deforming if they are overloaded.

- **Roller Bearings**

Roller bearings are designed to carry heavy loads—the primary roller is a cylinder, which means the load is distributed over a larger area, enabling the bearing to handle larger amounts of weight. This structure, however, means the bearing can handle primarily radial loads, but is not suited to thrust loads. For applications where space is an issue, a needle bearing can be used. Needle bearings work with small diameter cylinders, so they are easier to fit in smaller applications.

- **Ball Thrust Bearings**

These kinds of bearings are designed to handle almost exclusively thrust loads in low-speed low-weight applications. Bar stools, for example, make use of ball thrust bearings to support the seat.

- **Roller Thrust Bearings**

Roller thrust bearings, much like ball thrust bearings, handle thrust loads. The difference, however, lies in the amount of weight the bearing can handle: roller thrust bearings can support significantly larger amounts of thrust load, and are therefore found in car transmissions, where they are used to support helical gears. Gear support in general is a common application for roller thrust bearings.

- **Tapered Roller Bearings**

This style of bearing is designed to handle large radial and thrust loads—as a result of their load versatility, they are found in car hubs due to the extreme amount of both radial and thrust loads that car wheels are expected to carry.

PEDESTAL BEARING

A pillow block usually refers to housing with an included anti-friction bearing. A pillow block refers to any mounted bearing wherein the mounted shaft is in a parallel plane to the mounting surface, and perpendicular to the center line of the mounting holes, as contrasted with various types of flange blocks or flange units. A pillow block may contain a bearing with one of several types of rolling elements, including ball, cylindrical roller, spherical roller, tapered roller, or metallic or synthetic bushing. The type of rolling element defines the type of pillow block. These differ from "plumber blocks" which are bearing housings supplied without any bearings and are usually meant for higher load ratings and a separately installed bearing.

The fundamental application of both types is the same, which is to mount a bearing safely enabling its outer ring to be stationary while allowing rotation of the inner ring. The housing is bolted to a foundation through the holes in the base. Bearing housings may be either split type or solid type. Split type housings are usually two-piece housings where the cap and base may be detached, while others may be single-piece housings. Various sealing arrangements may be provided to prevent dust and other contaminants from entering the housing. Thus the housing provides a clean environment for the environmentally sensitive bearing to rotate free from contaminants while also retaining lubrication, either oil or grease, hence increasing its performance and duty cycle.

Bearing housings are usually made of grey cast iron. However, various grades of metals can be used to manufacture the same, including ductile iron, steel, stainless steel, and various types of thermoplastics and polyethylene-based plastics. The bearing element may be manufactured from 52100 chromium steel alloy (the most common), stainless steel, plastic, or bushing materials such as SAE660 cast bronze, or SAE841 oil impregnated sintered bronze, or synthetic materials.

Fig. PEDESTAL BEARING

YOKE MECHANISM

The Scotch yoke (also known as slotted link mechanism is a reciprocating motion mechanism, converting the linear motion of a slider into rotational motion, or vice versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The location of the piston versus time is a sine wave of constant amplitude, and constant frequency given a constant rotational speed.

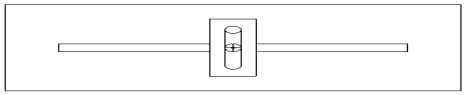


Fig. Yoke mechanism.

Applications of yoke mechanism:

This setup is most commonly used in control valve actuators in high-pressure oil and gas pipelines. Although not a common metalworking machine nowadays, crude shapers can use Scotch yokes. Almost all those use a Whitworth linkage, which gives a slow speed forward cutting stroke and a faster return.

It has been used in various internal combustion engines, such as the Bourke engine, SyTech engine, and many hot air engines and steam engines. The term *scotch yoke* continues to be used when the slot in the yoke is shorter than the diameter of the circle made by the crank pin. For example, the side rods of a locomotive may have scotch yokes to permit vertical motion of intermediate driving axles.

CROP CUTTING BLADES:

The Crop cutting blades are two types they are given below

- Rotary blades
- Reciprocating blades

Rotary Blades:

A **rotary cutter** is a tool generally used by quilters to cut fabric. It consists of a handle with a circular blade that rotates, thus the tool's name. Rotary cutter blades are very sharp, can be re sharpened, and are available in different sizes: usually smaller blades are used to cut small curves, while larger blades are used to cut to straight lines and broad curves. Several layers of fabric can be cut simultaneously with a sharp (fresh) blade, making it easier to cut out patchwork pieces of the same shape and size than with scissors. Quilters use rotary cutters with specially designed templates and rurals made of approximately 1/8-inch thick clear or color-tinted plastic.
The first rotary cutter was introduced by the Alfa company in 1979 for garment making, however, it was quickly adopted by quilters. Prior to the invention of the rotary cutter, quilters traced handmade templates of the necessary shapes onto the wrong side of fabric and added 1/4-inch seam allowances all around. Templates were often handmade of (cereal box type) cardboard and the pencil wore down the edges with repeated tracings, rendering them inaccurate; new templates would be made several times until all the patchwork pieces were cut. Pieces were usually cut one at a time with dressmaking scissors, which were often heavy and had long blades that were designed for cutting large pieces for garments but were cumbersome to use for cutting small pieces for patchwork. The rotary cutter gained almost immediate widespread use among quilters after its introduction and, along with the accompanying development of strip techniques, revolutionized quilting.

Today there are many companies making rotary cutters. Cutters come in a variety of handle types and some include specialty blades to cut curved or zigzagged lines. Most have retractable blades that can be locked to prevent injury.

Fig. Rotary blade cutters

Reciprocating Blades:

A reciprocating saw is a type of saw in which the cutting action is achieved through a push-and-pull ("reciprocating") motion of the blade. The term is commonly applied to a type of saw used in construction and demolition work. This type of saw, also known as a hognose, reciprocating saw, or Seawall (a trademark of the Milwaukee Electric Tool Company) has a large blade resembling that of a jigsaw and a handle oriented to allow the saw to be used comfortably on vertical surfaces. The typical design of this saw has a foot at the base of the blade, similar to that of a jigsaw. The user holds or rests this foot on the surface being cut so that the tendency of the blade to push away from or pull towards the cut as the blade travels through its movement can be countered.

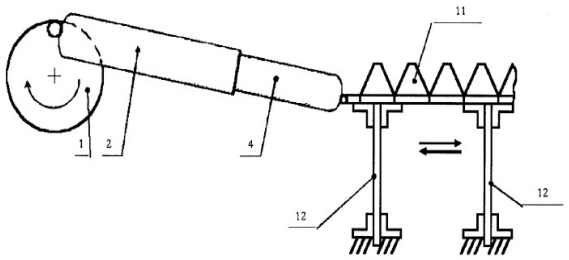
Fig. Reciprocating blades

Working Principle:

- When the worker will pull or pedaling the machine with the pedal system, the wheels are starts to rotating.
- On shaft the sprocket is mounted having chain drive with 2nd shaft having freewheel and cycle wheel which transfer the rotation to the front wheels. On this front wheel 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 maintained and power is obtained for cutting purpose.

MECHANISM

It is a walk behind type of harvester which is powered by the pedal. With the help of V- belt, drive power is transmitted to gearbox. As the human power, a bevel gearbox and a spur gearbox is used. Direction of the drive can be changed by 90˚ with the help of bevel gears. Rotary motion of shaft converted into reciprocating motion of cutter blade with the help of one end of this output shaft is connected to slider crank mechanism. Scissoring action is created when reciprocating cutter blade slides over fixed blade which is responsible for cutting the crops. Collecting mechanism consist of flat belt with collecting plates are bolted on it. Collecting belt simply carry cut crops sideways.



Фиг. 1

V. CONCLUSION & FUTURE SCOPE

CONCLUSION:

The harvester developed is just proof of concept. This has to still undergo a detailed analysis of components used. The new design of the cutter bar is to be tested and changed as per the requirements. The innovative three stage threshing mechanism will result in a yielding good Quality seeds. The machine is designed to run without external sources like diesel engines, (Power tiller or tracter). The machine can be operated by single labour. The machine will eliminate the labour problem and struggles of labour in cutting the crop. This machine will serve a great deal for small scale chickpea cultivators.

FUTURE SCOPE:

Though the machine has some innovative concepts, there is still a lot if scope for development like

• The machine has to be provided with gear box for different speed ad torque generation.
• The machine can be made lighter by doing detailed analysis of the design and
Removing excess material wherever it is not necessary.
• With minimal modifications this machine can be used for harvesting of different crops.
• Additionally provision can be provided of connecting to a tiller or tractor instead of the
Diesel. (for the farmers who already own a tiller or tractor)
• A better and large storage unit has to be provided to collect the seeds.
• The flow of the unwanted crop waste is to be made more efficient.

REFERENCES

[1] "Fabrication and performance test of an Ultraportable Crop cutter" Mr. G Maruthi Prasad Yadav, GMD Javeed Basha IJRSET Volume 2
[2] "Design and fabrication of small scale Sugarcane Harvesting Machine" Laukik P. Raut, Adarsh J Jain, Shashank Karne, Srinivas Ratod, Vinay N1 Toted and Karan ISSN 2278 – 0149 .ijmerr Vol. 2, No. 3, July 2013
[3] Relationship between Stalk Shear Strength and Morphological Traits of Stalk Crops, by Li Liang and YumingGuo.
[4] Farm power sources, their availability and future requirements to sustain agricultural production, by N. S. L. Srivastava.
[5] P. K. Verma "Users compendium on small agriculture machinery and equipment"s ".
[6] Abdul Shakoor khan and M Salim "Rice harvesting and threshing" PAK J FOOD SCI, 12(1-2): 45-52.
[7] Shutter Bugger "Pedal powered battery charger"
[8] David Butcher "Pedal power generator- Electricity from exercise"
[9] *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 12, Issue 3 Ver. I (May. - Jun. 2015), PP 15-22 www.iosrjournals.org*
[10] **International Research Journal of Engineering and Technology** (IRJET) e-ISSN: 2395 -0056 **Volume: 03 Issue: 07 | July-2016** www.irjet.net p-ISSN: 2395-0072