NOVATEUR PUBLICATIONS
International Journal of Innovations in Engineering Research and Technology [IJIERT], ISSN: 2394-3696
Conference Proceedings of i - Mechanical Engineering Students Conference 2018 (i – MESCON 18)
28th December, 2018

PAPER ID –OT01

SHELTER MECHANISM FOR FARMING

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Abstract— From last few years, there has been a significant rise of technology in the field of farming. But the climatic conditions cannot be controlled and the effect of climate on certain plants leads to huge losses. .Environmental condition has been significant effect on the plant growth. The objective of this project is to create a system which will control the opening and closing of shelter using pneumatic piston cylinder arrangement.

Keywords—Environmental cond., Pneumatic , shelter

I. INTRODUCTION

From last few years, there has been a significant rise of technology in the field of farming. But the climatic conditions cannot be controlled and the effect of climate on certain plants leads to huge losses. Excess rainfall can cause water logging of the soil, but the only way of preventing this problem is by good soil preparation and cultivation curative measures are generally impossible. Environmental condition has been significant effect on the plant growth. All plant required certain climatic conditions for their proper growth. High winds can damage plants at all times of the year, causing the roots to become dislodged from the soil by rocking and growth to become lop-sided by bud death on the exposed side. In case of grapes farming in last few years excess rainfall and strong winds has led to loss of hectares of production in various parts of the country and farmers had to suffer severe losses.

The objective of this project is to create a system which will control the opening and closing of shelter using pneumatic piston cylinder arrangement and provide preventive measurement in order to aid in the growth of plants of all types. The pneumatic operated shelter has been equipped with rack and pinion mechanism to open and close the shelter in case of heavy rains and high velocity winds. In normal conditions the structure will remain open but when there is excess amount of rains and winds the compressed air will actuate the pneumatic cylinder which in turn will move the rack and pinion mechanism and the shelter will close . When the conditions are back to normal the shelter will open again.

II. LITERATURE REVIEW

A winter protective shelter for a plant includes a frame and a cover. The frame includes a plurality of legs adjustably positioned around a plant. The legs are coupled to provide a Support structure around at least a portion of the plant. The cover is adapted to be at least partially supported by the frame in order to establish a shelter providing a barrier between at least a portion of the top and a side of the plant and an exterior of the shelter. The winter protective shelter may uniquely protect valuable plants and shrubs from destruction, breakage, and dehydration caused by tempera- ture extremes and winter precipitation.[5]

A collapsible Shelter/tent, Such as for example an umbrella tent, has a collapsible frame with a plurality of legs that are erected by manually moving two devises toward one another.The shelter/tent includes an improved locking mechanism that very Securely maintains the Structure in an erected position. The improved locking mechanism includes a generally vertical pin extending from one of the devises that is received inside a Socket Supported on the other of The Socket has an engaging member therein that can engage a groove in the generally vertical pin after Said generally vertical pin has been inserted into Said Socket.The erection device includes an elongated pole and a slide member that can be used to control relative movement of the devises toward and away from one another.[1]

This relates to rack-and-pinion mechanism, and has for its object the provision, in such mechanism, of devices which shall practically eliminate the element of friction. The mechanism, briefly described, consists of a shaft, a circumferentially-grooved collar mounted thereon, a pinion-gear having a hub that surrounds the collar and is provided with an interior groove, a ring of balls seated in grooves, and a rack formed with teeth that mesh with the pinion-teeth and with a lateral extension that bears upon the pinion-hub.[3]

Stansell and Sparrow devised a battery-operated, automatic shelter. Fletcher and Maurer built a plastic-covered shelter that was partially automatic. In 1966 a shelter was constructed at Lethbridge that was Completely automatic with provision for manual operation, Strong and rigid to withstand high winds and to ensure per maintanence, High enough to accommodate all field crops, Large enough to provide appreciable space for plot area or lysimeters, Made largely of prefabricated or readily available materials, Relatively simple to operate.[2]

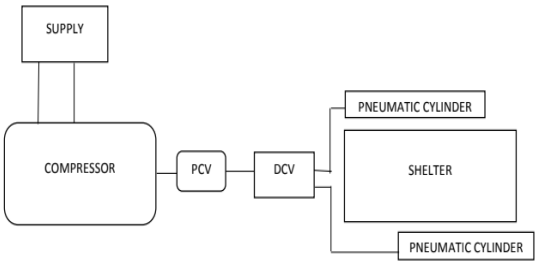
The drive assembly includes a pinion shaft rotatably supported by a bearing assembly which is rigidly secured to the frame. A drive pinion is se cured to one end of the shaft, and a reducer gear box is mounted on the other end of the shaft. A motor is connected to the gear box for rotating the shaft and the drive pinion, and the motor and gear box are pre vented from rotating with the shaft by a torque mount which connects the motor to the frame but which permits limited movement of the motor relative to the frame to reduce shocks. An overspeed

pinion is mounted on a second shaft which is also rotatably mounted on bearings on the frame.[4]

A rack and pinion assembly, especially suited for automotive steering linkages, having at least one yoke member slidably supporting the rack bar on the side remote from the rack, and preferably directly opposite that portion of the rack engaging the pinion, wherein the yoke is urged against the rack bar by a spring biased slipper in wedge-fitting, sliding relationship with the yoke. The slipper and yoke have inclined mating surfaces which establish a non-reversing wedge angle relationship so that the spring bias need only be sufficient to take up looseness and wear without supporting the load on the yoke. [6]

III. METHODOLOGY

A. Block Diagram



B. Basic ms frame structure

The below figure shows the primary structure used for the project. The structure is made up of mild steel. The structure dimension are 5ft * 5ft .Height of the structure is 3 ft. Electric arc welding is done to the steel angles to join them as to obtain the desire square shape. The shaft will be mounted on the frame with the help of shaft housing. The mechanism components will be mounted on the parallel sides of the structure. A C-shaped frame will be attatched to the shaft which will oscillate as the shaft rotated.

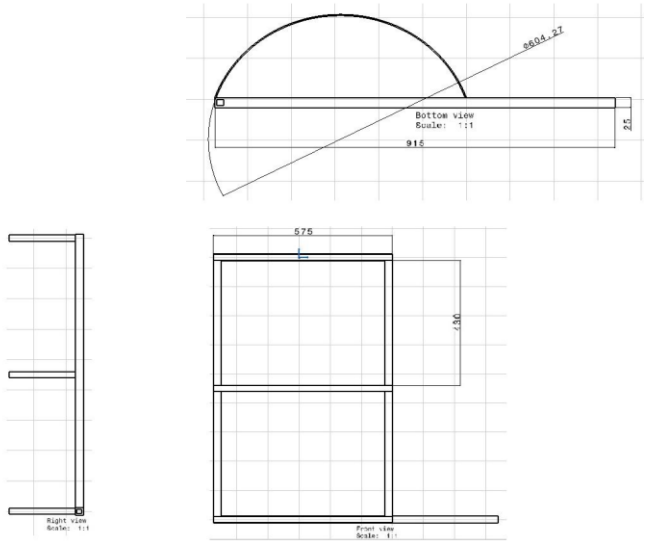
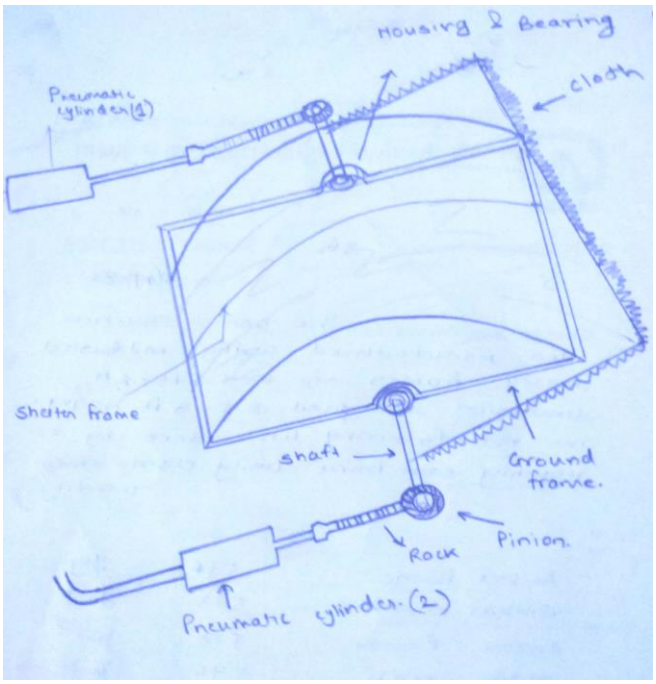


Fig. Primary Frame structure

C. Rack and Pinion Design

A rack and pinion gear system is composed of two system of cars to convert the rotary motion to the steering gears. The normal helical gear is the pinion gear and the wheel to the side to side motion in the wheel straight helical gear is the rack. The rack has teeth cut into A rack and pinion consists of a pinion engaging and it and they mesh the teeth of the pinion gear. Rack and transferring motion to or from a special kind of spur gear, pinion gear provides a greater feedback and steering called a rack, consisting of a series of teeth in a straight sensation. A well designed mechanism such as the line on a flat surface. The rack and pinion changes linear rack and pinion gear save effort and time. The rack and motion into rotary motion, or vice versa the rack and pinion is used to convert between rotary and linear pinion is used to convert between rotary and linear motion. Rack and pinion can convert from rotary to linear motion. Rack and pinion can convert from rotary to linear or from linear to rotary. Selecting the right gear rack depends on many things, including accuracy and load requirements, design constraints, and cost. Sometimes it is possible that two different racks would work for the same application, but each having its own advantages and disadvantages. Rack& pinions are typically selected based on the peak cycle forces, which usually happen during accelerations and decelerations. These cycle forces depend on the weight being moved, the speed vs. time profile for the cycle, the friction of the axis bearings, and any other external forces acting on the axis.

IV. DESIGN AND ARRANGEMENT



1) Direction Control Valve

Directional control valves are one of the most fundamental parts in hydraulic machinery as well and pneumatic machinery. They allow fluid flow into different paths from one or more sources. They usually consist of a spool inside a cylinder which is mechanically or electrically controlled. The movement of the spool restricts or permits the flow, thus it controls the fluid flow.

2) Pneumatic Cylinder

Pneumatic cylinders can move products directly or indirectly by pushing, pulling, lifting, lowering, or rotating, and can keep them from moving by clamping them in place. The basic, rod-style industrial cylinder is used which consists of a tube sealed by end caps. A rod attached to an internal piston extends through a sealed opening in one of the ends. The

cylinder mounts to a machine and the piston rod acts upon the load. A port at one end of the cylinder supplies compressed air to one side of the piston, causing it (and the piston rod) to move. The port at the other end lets air on the opposite side of the piston escape usually to atmosphere.

3) Rack and Pinion

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion. The mechanics used is straight teeth have the tooth axis parallel to the axis of rotation. Straight teeth that run parallel to the axis of the gear. Load movement or transfer is manual or walk-behind.

4) Frame

The primary frame structure used is made of mild steel material. The domed shaped structure holds the almost all equipments of the system and is the shelter frame used in the project.

5) Gear

The cam is rotate when the gear arrange to the treaded ring rotate. The gear is connected to cam with the shaft. On gear shear stresses is applied.

6) Shaft Bearing

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.

V. CONCLUSION

The production rate will increase in modern farming using automated operating shelter rather than in traditional farming. And the losses which farmer has to sustain due to uneven nature of the climate can be minimised using this project. The damage caused due to heavy rainfall and high velocity wind will be reduced resulting protection to crops minimizing the losses.

VI. REFERENCES

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