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Mechanisms used in Agriwaste Briquette Making Machine

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ABSTRACT

Mechanism is an assembly of moving parts performing a complete functional motion, Often being part of a large machine; linkages the structure or arrangement of parts of a machine or similar device. In this paper an attempt is made to describe a mechanisms like rack and pinion, chain drive, ratchet and pawl, pedal mechanism used in agriwaste briquette making machine.

Keywords : Rack And Pinion, Chain Drive, Ratchet and Pawl, Pedal.

I. INTRODUCTION

Agricultural wastes are waste from farming, forestry, horticulture and other farm operations. There is a rapid increase in the volume and types of agricultural wastes due to intensive agriculture in the wake of population growth and improved living standards, which are now becoming a major problem as rotten waste biomass emits methane and leach-ate. Open burning of these wastes by farmers usually generates carbon dioxide (CO2) and other local pollutants (UNDP, 1982). Most agricultural solid wastes are generated by the rearing of animals, and harvesting and processing of crops. These wastes take the form of residual stalks, straw, leaves, roots, husk, nut or seed shells, waste wood and animal husbandry waste.

In order to manage these waste agricultural biomass by converting them into useful material resource, we have the concept of Design And Development of Agriwaste Briquette making Machine. And to fabricate this machine we require different types of mechanisms such as chain drive, rack and pinion, ratchet and pawl, etc. they are shown as follows.

II. NAME OF COMPONENT AND ASSEMBLY

1– Hopper
2 – Ratchet and Pawl
3 – Rack and Pinion Box
4 – Channel
5 – Die
6 – Punch
7 – Pedal Mechanism
8 – Hopper Base Plate
9 – Supporting Stand
10 – Chain Drive

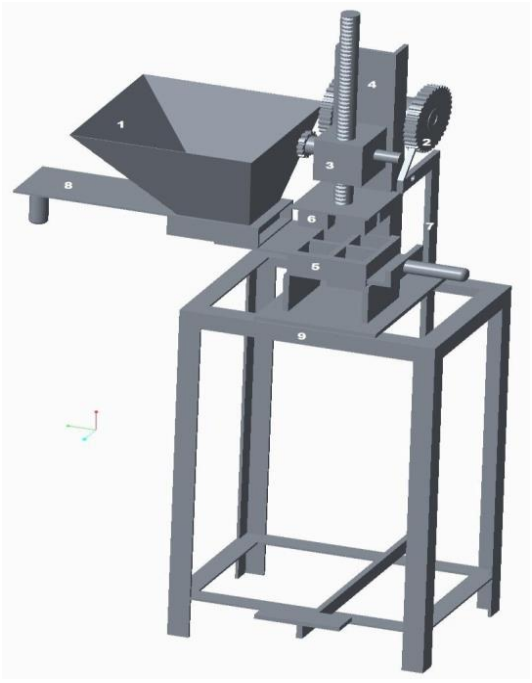

Figure 1. Conceptual Diagram of Agriwaste Briquette Making Machine

III. NAME AND DESCRIPTION OF MECHANISMS USED

The above figure shows the experimental set up of Agriwaste Briquette Making Machine which consist of the above mentioned parts .In this machine operator press the foot lever. That applied force transmits towards ratchet through the intermediate linkage that is converting the foot pressure into the rotation of shaft by using the ratchet mechanism.

On same shaft at opposite side small sprocket of chain drive is mounted which is rotate the other shaft by using the chain drive. The second shaft is mounted on quarterly threaded shaft which is converting the rotation of shaft in vertical motion of other shaft. That vertical motion will create the pressure on the die by using punch for creating the briquette.

Figure 2. Actual Diagram of Agriwaste Briquette Making Machine

1. Chain Drive

Figure 3. Proposed diagram of Chain Drive

Figure 4. Actual diagram of Chain Drive

It is a way of transmitting mechanical power from one place to another. Most often, the power is conveyed by a roller chain, known as drive chain or transmission chain passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Roller chain or bush roller chains the type of chain drive most commonly used for transmission of mechanical power on many kinds of domestic, industrial and agricultural machinery.

It is driven by the tooth wheel called mission of power transmission of sprocket. It is a simple, reliable and efficient means of power transmission. It is also used in a wide variety of machines beside vehicles. A Chain drive consists of an endless series of chain links that mesh with toothed sprockets. Chain sprockets are locked to the shafts of the driver and driven machinery. The chain acts like an endless gear rack, while the sprockets are similar to pinion gears. Chain drives provide a positive form of power transmission.

A sprocket is a toothed wheel that fits onto a shaft. It is prevented from rotating on the shaft by a key that fits into keyways in the sprocket and shaft. A chain is used to connect two sprockets. One sprocket is the Driver Sprocket and the other one is the Driven Sprocket. Motion and force can be transmitted via the chain from one sprocket to another, therefore from one shaft to another. Chains that are used to transmit

motion and force from one sprocket to another are called power transmission chains.

2. Ratchet And Pawl Mechanism

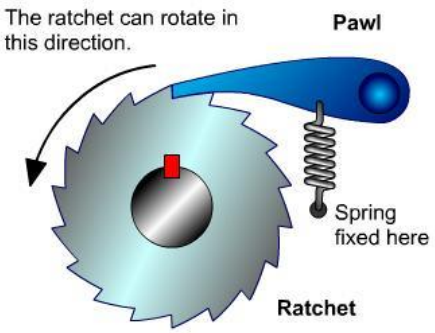

Figure 5. Proposed diagram of Ratchet and Pawl

Figure 6. Actual diagram of Ratchet and Pawl

The ratchet and pawl is a very simple device which allows a shaft to turn only in one way. The pawl and ratchet mechanism plays a vital role in providing one way transmission and safety against heavy loading conditions. A ratchet is composed of three main parts: a round gear (or a linear rack), a pawl (also called a "click"), and a base (or mount).

Gear: Ratchets composed from gears are typically round and are composed of uniform but asymmetric teeth designed to limit motion to a single direction. The edges on one side of the gear's teeth have a steep slope (oftentimes nearly perpendicular to the tangent of the gear's circumference) while the other edges of the gear's teeth have a moderate or gradual slope.

Pawl ("Click"): The pawl is the part that makes contact with the gear or linear rack. When the gear (linear rack) is rotated (linearly moved) in one direction (counter-clockwise in the image above), the pawl will slide over the teeth without restricting the natural motion of the device. When the direction of motion is reversed the pawl will come into contact with the steep slope on the gear tooth and will impede motion.

Mount: Gears or Linear Racks and Pawls are typically mounted in a fixed relationship to one another on a mount.When the ratchet are moving in the forward direction the pawl easily slides over, the tip of each tooth. When ratchet move in the opposite or backward direction, pawl is locked between the teeth and prevents the backward motion. The ratchet wheel is widely used in mechanical field. The materials considered for ratchet and pawl are plain carbon steel and structural steel respectively both surface are considered to be hardened.

3. Rack And Pinion Mechanism

Figure 7. Proposed diagram of Rack and Pinion

Figure 8. Actual diagram of Rack and Pinion

It is a device for converting rotary into linear motion and vice versa, in which a gearwheel (the pinion) engages with a flat toothed bar (the rack) having a track rod with a rack along part of its length that engages with a pinion attached to the steering column. This system is a type of linear actuator. A rotational input drives a circular gear, called the 'pinion gear'. The teeth off this are in mesh with those of a straight bar called a 'rack'. It is easiest way to convert rotary motion into linear motion. Rack and pinion gears gives easier and more compact control over the vehicle.

A rack-and-pinion gearset is enclosed in a metal tube, with each end of the rack protruding from the tube. A rod, called a tie rod, connects to each end of the rack. For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and forces a train up a steep slope. A generating rack is a rack outline used to indicate tooth details and dimensions for the design of a generating tool.

4. Pedal Mechanism

This mechanism consist of the parts like pes plate for keeping the foot on it and intermediate linkages to transmits the force applied by human foot to the ratchet and pawl mechanism. Pivot and restraining spring arrangement is used for bringing the intermediate linkages to its original position after removing the force applied on the pes plate.

When operator applied the force on the pes plate, the other end of the linkage system is move upward and that upward motion of link end is transmits to pawl which is converted into rotary motion by using the ratchet. While performing this action spring is stretched and after removing the force from pes plate it is come back to its original position.

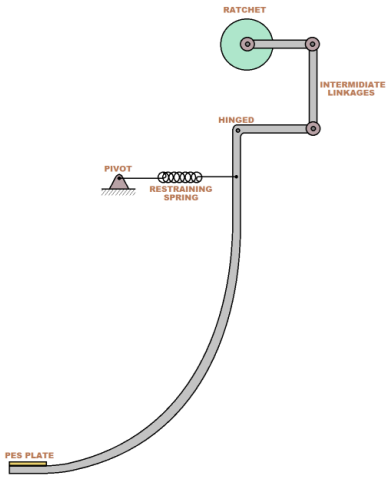

Figure 9. Proposed diagram of Pedal Mechanism

Figure 10. Actual diagram of Pedal Mechanism

IV. CONCLUSION

The main conclusion will be drawn find out whether it is possible to automate a skilled manual process which would avoid worker fatigue. Also the future scope is developing the generalized machine for any shape, size and category of agriwaste.

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