

Innovative Mechanical Winder

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Abstract:

This project is a two-way powered mechanical winder using either hand-lever mechanism or a DC motor. The final prototype is capable of winding a single thread in 2-3 minutes using a 9V dc motor with a 6V adaptor, the speed is directly proportional with the dc motor's voltage so the higher the voltage the faster it winds. It is mostly consist of recycled materials from scrap machine that made the prototype very cost efficient. The prototype can be innovated to become a universal mechanical winder by making the spool detachable to be able to change it with another one either a reel of wires, ropes or tapes.

Keywords — Winder, DC Motor, Linkages, Gears, Bearings.

Introduction

A winding machine or winder is a machine for wrapping string, twine, cord, thread, yarn, rope, wire, ribbon and tape onto a spool, bobbin, reel, etc.

Winders have a centre roll (a bobbin, spool, reel, belt-winding shell, etc.) on which the material is wound up. Often there are metal bars that travel through the centre of the roll, and are shaped according to their intended purpose. A circular bar facilitates greater speed, while a square bar provides a greater potential for torque. Edge sensors are used to sense how full the centre roll is. They are mounted on adjustable slides to accommodate many different widths, as the width increases as the centre roll is filled.^[1]

Nowadays, machines like this have a wide scope of usefulness in homes and especially in industries that deals with winding materials to parts

and they vary from their capabilities, design, and applications.

The objective of the design is to fabricate a winder which is innovative and to show a simple way of constructing it with the available resources at hand but at the same time achieve the desired output. Almost all of our resources are recycled materials, so it was really a low cost project but with a high functionality.

The idea of making it a two-way powered system, whether manual (using the hand-lever) or automatic (using the dc motor) is very reliable because it reassures that the machine can work continuously with or without the use of electricity.

Device Mechanism and Prototyping

The design has five basic components: gears, bearings, belt, linkage and dc motor. The structural design is consists of the base, winder, spool, hand

wheel and holder. The bearings hold the cylindrical shaped wood which links them with each other and transmits rotation. The belts convey the rpm given by the dc motor and/or hand wheel to be distributed in other parts, refer to Figure 1.

The base supports all the functioning parts of the project, refer to Fig. 2. The winder weaves from right to left to control the distribution of thread. The spool winds up the threads it receives from the winder. The dc motor is the primary source of power of the machine while the hand wheel is the secondary source, refer to Fig.2. The holder is where the thread roller is placed to be weaved or to be distributed by winding. The final prototype with the wound thread is shown in Figure 3.

Recommendation

The proponents recommend to use properly fabricated bevel gears, so they can mesh properly and the product will run smoothly. Controllers and switching devices can be added to control the speed automatically and enhance its productivity.

It is also recommended to change the cylindrical wood with shaft and other parts into any metallic material so the structural integrity will be even more durable and the bearings will be able to hold it safely.

It can still be innovated to become a universal mechanical winder by making the spool detachable to be able to change it with another one either a reel of wires, ropes or tapes. But also it needs to be fabricated into a larger machine to be able to accommodate the strong types of coils, strings and etc.

Then an inverter can be used to make an AC-DC circuit for the DC motor(12v) so it can be independently plugged to any source and also to add safety precautions. By doing so, more winders can be added so the production will increase dramatically and increase the work done simultaneously.

Conclusion

There are various ways to innovate, modify and customize designs like this. In many manufacturers like textile manufacturing, winders are very necessary and it is being upgraded to suit the needs in the industry. And in our modern day, machines are now constantly being upgraded and new technological advancements are made so it won't be long if a new and better mechanical winder is made.

Mechanical winders are hardly noticed because of its simplicity in its working capacity but if we look closely, it has a big contribution to our industry. We, as proponents of this project, being able to innovate this kind of machine is a challenge and is proven to be very useful in our knowledge in designing and prototyping.

The two-way powered winder is capable of winding a single thread in 2-3 minutes using a 9V dc motor with a 6V adaptor, the speed is directly proportional with the dc motor's voltage so the higher the voltage the faster it winds.

Reference

- [1] Good, JK; Roisum, David R. (1 January 2008). *Winding: Machines, Mechanics & Measurements* (1ST ed.). Lancaster, PA:

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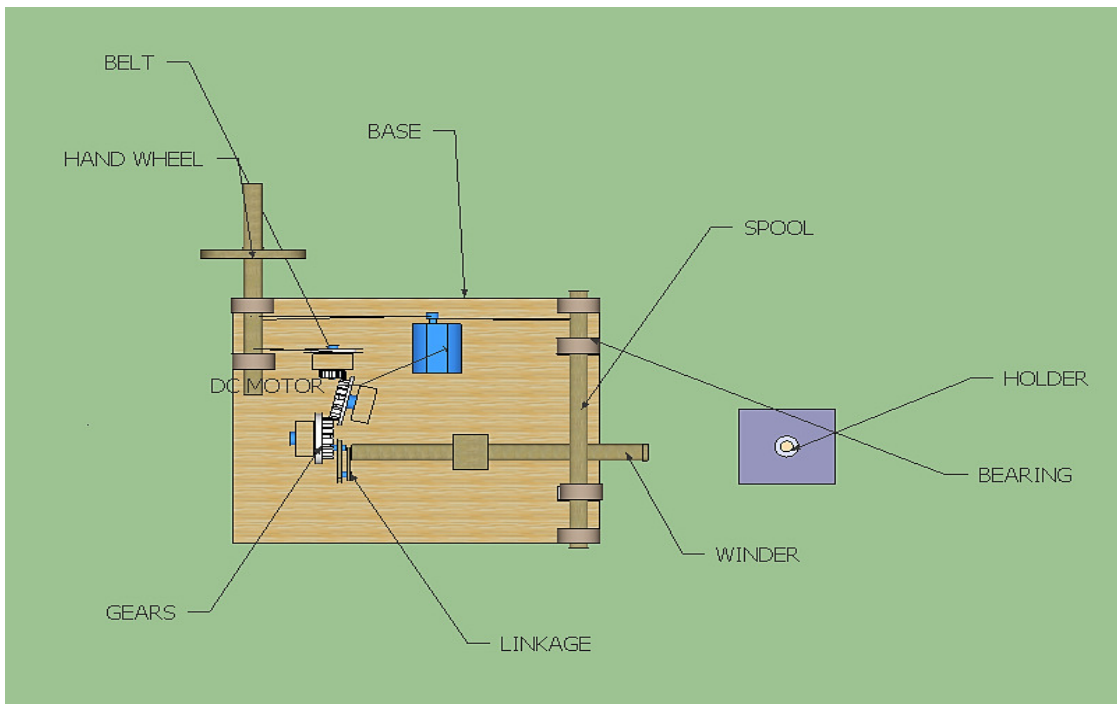


Figure 1. Top View

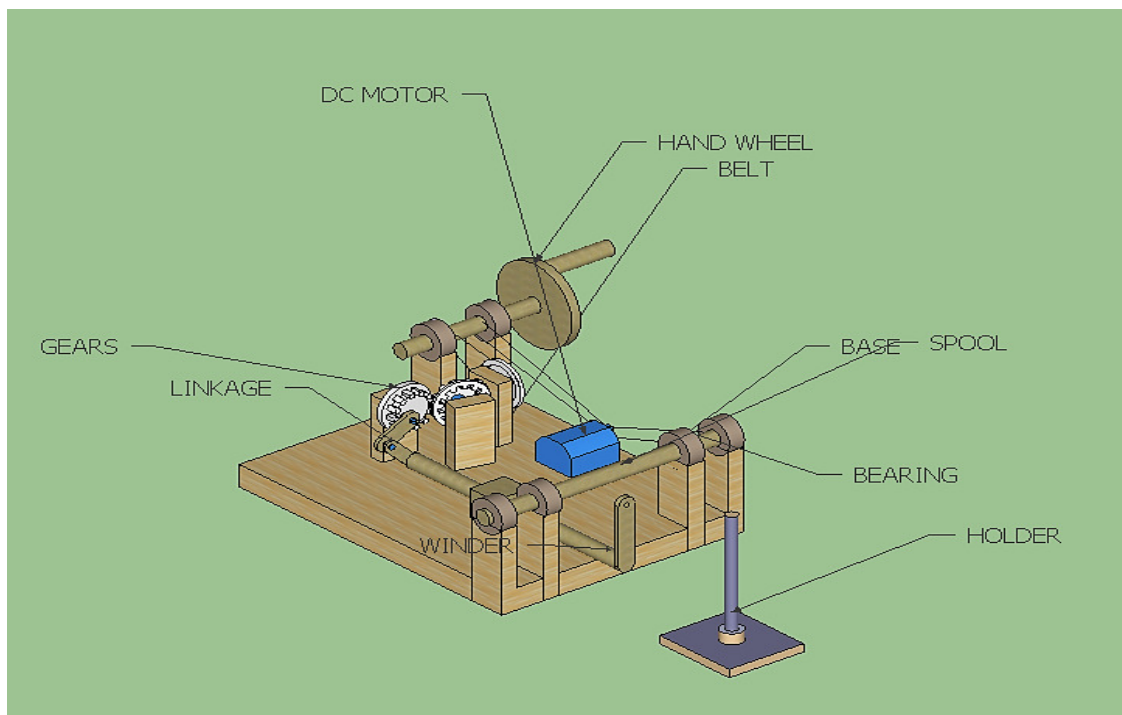


Figure.2. Isometric View Left Side

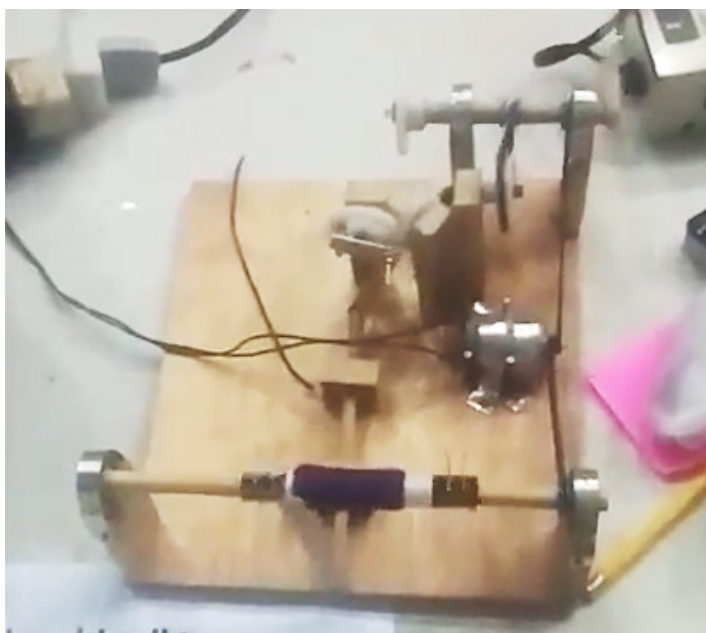


Figure 3. Finished Product



Figure 4. The Group during the Project Presentation