DESIGN AND FABRICATION OF PORTABLE FENCE WINDING MACHINE

A PROJECT REPORT

Submitted by

RAVINDHAR M

SATHEESHWAR V

SHRI KRISHNA PRASATH N

THULASIDHARSHAN C

In partial fulfilment of the degree

of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

DECEMBER 2024

DESIGN AND FABRICATION OF PORTABLE FENCE WINDING MACHINE

A PROJECT REPORT

Submitted by

RAVINDHAR M

SATHEESHWAR V

SHRI KRISHNA PRASATH N

THULASIDHARSHAN C

In partial fulfilment of the degree

of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

DECEMBER 2024

RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report titled "**DESIGN AND FABRICATION OF PORTABLE FENCE WINDING MACHINE**" is the Bonafide work OF **RAVINDHAR M (811722114035), SATHEESHWAR V (811722114039), SHRI KRISHNA PRASATH N (811722114040),THULASIDHARSHAN C (811722114044)**, arrived out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was inferred on an earlier occasion on this or any other candidate.

SIGNATURE

Dr. R. YOKESWARAN M.E.,
Ph.D.,
HEAD OF THE DEPARTMENT
ASSOCIATE PROFESSOR
Department of Mechanical Engineering
K. Ramakrishnan College of Technology(Autonomous)
Samayapuram – 621 112

SIGNATURE

DR.SATHISHKUMAR G, M.E. (Ph.D)
SUPERVISOR
ASSISTANT PROFESSOR
Department of Mechanical Engineering
K. Ramakrishnan College of Technology(Autonomous)
Samayapuram – 621 112

Submitted for the viva-voce examination held on ……

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

We jointly declare that the project report on **"DESIGN AND FABRICATION OF PORTABLE FENCE WINDING MACHINE"** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"K RAMAKRISHNAN COLLEGE OF TECHNOLOGY"** for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfillment of the requirement of the award of Degree of **BACHELOR OF ENGINEERING**.

SIGNATURE

_____

RAVINDHAR M

_____

SATHEESHWAR V

_____

SHRI KRISHNA PRASATH N

_____

THULASIDHARSHAN C

Place: Samayapuram

Date:

ACKNOWLEDGEMENT

It is with great pride that I express our gratitude and in-debt to our institution **"K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY (Autonomous)**", for providing us with the opportunity to do this project.

I are glad to credit honorable chairman **Dr. K.RAMAKRISHNAN, B.E.**, for having provided for the facilities during the course of our study in college.

I would like to express our sincere thanks to our beloved Executive Director **Dr. S. KUPPUSAMY, MBA, Ph.D.,** for forwarding to our project and offering adequate duration in completing our project.

I would like to thank **Dr. N. VASUDEVAN, M.E., Ph.D.,** Principal, who gave opportunity to frame the project the full satisfaction.

I whole heartily thanks to **Dr R YOKESWARAN, M.E., Ph.D.,** Head of the department, Mechanical Engineering for providing his encourage pursuing this project.

I express my deep and sincere gratitude to my project guide **Dr. G SATHISH KUMAR, M.E(Ph.D)** Department of MECHANICAL ENGINEERING, for his incalculable suggestions, creativity, assistance and patience which motivated me to carry out this project.

I render my sincere thanks to our project coordinator **Dr. G ARUNKUMAR, M.E (Ph.D)** and other staff members for providing valuable information during the course.
I wish to express my special thanks to the officials and Lab Technicians of our departments who rendered their help during the period of the work progress.

INDEX

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 INDRODUCTION FENCE MACHINE

In the agricultural, construction, and fencing industries, managing and handling wire fencing materials can be a cumbersome and time-consuming task. Fence materials such as , chain link, and welded wire are essential in securing perimeters, but their maintenance, storage, and transport can be inefficient without the proper tools. One of the key challenges is how to efficiently roll and store these materials after they have been used or removed. Typically, wire fencing is wound manually or haphazardly, which can result in tangled, damaged, or inefficiently stored rolls that are difficult to reuse. A portable fence winding machine provides a practical solution to this problem. This device is specifically designed to allow for the efficient, uniform winding of wire fencing materials into compact rolls for easy storage and transportation. The machine can be operated manually or motorized, depending on user preference and scale of operation, and is built to be lightweight, portable, and easy to transport across various terrains, making it an essential tool for professionals in the fencing, agriculture, and construction sectors.

Figure 1.1 Winding Machine

The winding materials like chain link, and welded wire. The basic principle behind its operation is mechanical rewinding, where the wire is evenly coiled onto a spool or drum without tangling, kinking, or damaging it in the process of storage. This process can be achieved either manually with a crank handle or automatically through a motorized drive. Below, we will describe the working theory and the working of the fence winding machine.

The fence winding machine has some advantages in the areas of efficiency, safety, and ease of use over the conventional methods of handling wire fencing material. The following are some of the key merits realized when using a fence winding machine: Efficiency. The best thing about a fence-winding machine is that it winds wire fencing materials much faster than the processes of hand-winding. Whether it's a manual crank or a motorized system, the machine reduces the time required to roll up wire fencing, allowing workers to complete tasks quickly. Consistency and Uniformity.

Figure 1.2 Rolling Fence

The machine ensures that wire is wound evenly and tightly onto the spool, reducing the risk of tangled or uneven coils that can occur during manual winding. Simplification in Manual Labour Ergonomics The process of manually winding wire is considered an exertive activity, particularly while using big rolls of wire or even heavy wire fence. The machine reduces efforts of persons, thereby lowering the threat of RSI or physical stress to employees. workplace ergonomics.

1.2 HISTORY OF FENCE MAKING

1.2.1. Early Fencing Techniques (Pre-19th Century)

- **Manual Methods**: In the early days, fencing was constructed using natural materials like wood, stone, and hedges. Wire fences, particularly , began to appear in the late 19th century.

- **Manual Wire Winding**: Farmers and ranchers would manually wind wire on wooden spools or simply bundle it in a loose, disorganized manner for storage. This was time-consuming, labor-intensive, and prone to causing damage to the wire.

Invention of (1874)

- **Joseph Glidden's Patent**: The invention of by **Joseph Glidden** in 1874 revolutionized fencing. This new wire was essential for securing livestock, marking boundaries, and protecting crops, especially on the expanding frontier of the United States.
- As became widespread, efficient methods of handling and storing it became crucial, leading to the demand for machines that could aid in winding and organizing large amounts of wire.

Early Wire Winding Tools (Late 19th to Early 20th Century)

- **Manual Winding Tools**: Early tools for winding wire were simple devices that featured a crank handle and a spool. These tools helped reduce the physical labor involved in manually wrapping wire around posts or rolls but were still basic and labor-intensive.
- **Wire Reelers and Winders**: In the late 19th century, basic **wire reelers** (hand-operated spools with a crank) were developed to make wire handling more efficient for farmers, ranchers, and fence builders

Industrialization of Farming and Fencing (Early 20th Century)

- **Mechanization of Farming**: With the rise of industrial farming in the early 20th century, tools and machinery designed to streamline agricultural tasks became more common. The demand for **more robust fencing solutions** led to the gradual development of machines that could wind wire quickly and efficiently.
- **Motorized Models**: As motorized equipment became more common, wire winding machines started to include small motors and electric drive systems, reducing the physical effort required by workers.

The Emergence of Portable Winding Machines (Mid 20th Century)

- **Portability for Field Work**: In the mid-20th century, the need for **portable, lightweight machinery** led to the creation of more compact and mobile fence winding machines. These

machines were designed for field use, allowing workers to easily transport and use the machines on-site.

- **Increased Adoption**: By the 1950s and 1960s, portable fence winding machines became a staple for fence construction and agricultural work, allowing farmers and contractors to efficiently handle large volumes of wire for fencing projects.

Technological Advancements (Late 20th to Early 21st Century)

- **Automated Features**: In recent decades, fence winding machines have incorporated **electronic controls**, **adjustable tension mechanisms**, and **variable-speed motors** to allow for faster, more consistent winding.
- **Improved Materials**: The materials used in the construction of fence winding machines also improved, with manufacturers using lightweight, **corrosion-resistant metals** like **aluminum** and **stainless steel**, which enhanced durability and portability.
- **Multifunctional Devices**: Modern machines are often multifunctional, capable of winding a variety of wire types (e.g., , chain-link wire, welded wire) and supporting large-scale fencing projects.

Current Trends and Innovations (21st Century)

- **Automation and Robotics**: Some cutting-edge models now incorporate more advanced technologies, including **robotic systems** that can automatically adjust wire tension, monitor winding speed, and even detect faults in the wire during the winding process.
- **Eco-Friendly Solutions**: Given the growing focus on sustainability, there is an increasing emphasis on creating machines that are energy-efficient and reduce material waste, such as by preventing wire tangling and reusing old wire in an environmentally responsible manner.
- **Smart Features**: The latest machines may feature **smart technology**, allowing users to monitor the winding process via apps or digital interfaces and receive data on wire tension and storage efficiency.

Global Reach and Expansion

- **Global Adoption**: Today, fence winding machines are widely used around the world, from small farms to large industrial projects. The demand for efficient, automated, and portable fencing solutions continues to grow as agriculture and construction become more mechanized.

1.3 PURPOSE OF FENCE WINDING MACHINE :

The fence winding machine serves several key purposes that are crucial for both small-scale and large- scale operations involving wire fencing. It is designed to streamline the process of handling wire fencing, chain-link, and welded wire. Below are the primary purposes of a fence winding machine

1.3.1 Efficient Winding of Wire Fencing Materials

***Primary Purpose*:** The core purpose of the fence winding machine is to wind wire fencing materials into neat, organized rolls. This is particularly useful when the wire has been used in a fencing project and needs to be removed, stored, or transported.

***Time-saving*:** By automating or simplifying the winding process, the machine saves significant time compared to manual rolling. It enables workers to wind large quantities of wire much faster, improving overall efficiency.

1.3.2 Improved Organization and Storage

Compact Storage: The machine helps to wind the wire into uniform, compact coils that are easy to store. Properly wound wire takes up less space, is less likely to get tangled, and is easier to handle and transport.

Protects the Wire: Neatly wound wire is less prone to rust, tangling, and physical damage. Proper storage preserves the wire's quality, extending its lifespan and usability.

1.3.3 Prevention of Wire Damage

Prevents Kinks and Tangles*:* Manual winding is often imprecise and can result in the wire becoming tangled, kinked, or bent. The machine ensures that wire is wound consistently and evenly, preventing damage that could degrade the wire's integrity.

Uniform Winding: The tensioning and guiding systems in the winding machine ensure the wire is wound evenly, without slack or gaps, reducing the likelihood of damage that might occur during improper manual winding.

1.3.4 Reduction of Labor Intensity

Recycling Wire*:* A key purpose of the fence winding machine is to facilitate the **reuse of wire**. When wire is removed from a fence, it is often still in good condition but needs to be carefully wound to avoid damage. This machine makes it easy to store and reuse the wire in future fencing projects, reducing material waste and costs.

Cost-Effectiveness: By improving the reuse of wire fencing materials, the machine helps reduce the need for constant purchase of new fencing materials, resulting in long-term savings for farmers,contractors, and construction companies.

1.3.5 Portability for Field Use

Less Manual Labor: Winding wire manually is physically demanding, especially when dealing with large rolls or heavy types of wire. The machine reduces the labor involved by either automating or facilitating the winding process with a **manual crank** or **motorized drive**, making it less strenuous for workers.

Ergonomic Benefits: By eliminating the need for workers to bend over and manually twist wire for long periods, the machine improves workplace ergonomics and reduces physical strain and the risk of injury.

1.4 RAW MATERIALS :

1.4.1 Steel or Stainless Steel

- **Purpose:** The frame, structural components, and some internal parts (gears, axles, etc.) are typically made of steel or stainless steel. These materials provide the necessary strength and durability to handle the tension and stress involved in winding heavy wire or netting.
- **Properties:** Steel is strong, durable, and resistant to bending, while stainless steel offers additional resistance to rust and corrosion, especially in outdoor or agricultural environments.

1.4.2 Bearings and Bushings

- **Purpose:** Bearings or bushings in the winding mechanism, handles, or rotating parts allow smooth motion and reduce wear on parts that rotate under load.
- **Materials:** Typically made from steel, ceramic, or composite materials to withstand rotational stresses.

Figure 1.4.2 Bushing

Coatings and Finishes

- **Purpose:** To protect the machine from environmental factors such as rust, corrosion, and wear, certain parts may be coated with protective finishes like powder coating, galvanizing, or painting.
- **Materials:** Zinc (for galvanizing), epoxy powder coatings, or other rust-resistant coatings.

1.5 FENCE WINDING INDUSTRY

The fence winding industry involves the production, manufacturing, and use of machinery designed to wind and store fencing materials, such as wire or netting, for various applications, including agriculture, security, and construction. Winding fences efficiently reduces waste, preserves the integrity of materials, and makes them easier to transport and store. Important Aspects of the Fence Winding Industry Purpose of Fence Winding Machines Efficiency: Winding machines automatically coil or store the wire, thereby saving labour costs and improving operational efficiency. Space Saving: Proper winding allows the fencing material to be saved in a compact space. This is especially useful for large quantities. Material Preservation: Winding prevents damage caused by tangling, rusting, or deformation in wire or netting, thereby making it last longer. Portability: Many winding machines are designed to be mobile and can easily be used in field applications, making it convenient for temporary or mobile fences. Types of Fence Winding Machines Manual Winding Machines: These are simpler machines operated by hand, ideal for smaller operations or where portability and lower cost are priorities. Motorized Winding Machines: These machines employ electricity-powered motors or internal combustion to wind higher volumes of material in minimal time. . Semi-automated and fully automatic machines: Less hands-on labour is utilised when working with these machines. There are some that allow automated winding and cutting, meaning high-volume operations can be streamlined in productivity. Theoretical Basis of Winding Behind the Fence Mechanical Theory Rotational Mechanics: Winding of wire or netting involves rolling a spool or drum where the material is wound. This operation is governed by rotational motion and torque principles to assure that the wire is tightened without damaging the material. Friction and Tension: This process calls for the control of the tension applied to the wire so that it should neither stretch nor break. A considerable friction between the wire and the machine parts has also to be considered during the design of the machine, especially the rollers or guides. Materials Science Wire Composition: The type of wire (e.g., galvanized steel, stainless steel, or coated wire) influences how it behaves during winding. FIGURE 1.6 with high tensile strength are generally.

FIGURE 1.6 WINDING PROCESS

Easier to wind without breakage. Durability and Corrosion Resistance: Many winding machines are designed to work with corrosion-resistant materials, as wire often has to withstand environmental factors like rain, sun, or soil. Galvanization, or coating with materials like PVC, ensures the longevity of the wire once wound and stored. Automation and Control Theory Servo motors and feedback systems are implemented in advanced winding machines where a complete control system monitors using the sensors to achieve perfectly smooth winding and the proper tension through a sensor on the spindle of a servomotor-controlled reel for automatically adjusting speed and tension, as appropriate. Programmable Logic Controllers (PLCs): In winding machines, PLCs are set to control the winding precisely in terms of speed, tension, and layering in the wire on the spool. Efficiency Optimization Speed vs Quality: The challenge in this industry is to optimize the winding speed without compromising the quality of the coil. Machines must be designed to wind in a speedy manner but without tangling or causing damage to the wire.

1.7 IMPORTANCE OF FENCE WINDING MACHINE :

A fence winding machine is one of the most important pieces of equipment in fencing production industries, agricultural sectors, and construction industries. Its significance is that it is efficient, safe, and cost-effective in dealing with wire, mesh, and chain link fencing materials. Therefore it is crucial 1. Increases Efficiency It saves time for the process of winding and unwinding the fencing materials. Large quantities of wire or mesh can be handled with much less effort than when people do the work. Reduces downtime in projects requiring extensive fencing. 2. Ensures Consistency and Precision Produces neatly wound rolls that are easy to transport, store, and handle. Ensures uniform tension in the wire or mesh, preventing damage or irregularities.3. Enhances Worker Safety Minimizes physical strain on workers by automating the winding process Reduces the risk of injuries from handling sharp wires or heavy fencing rolls. 4. Cost-Effective Saves labor costs by reducing the need for manual work. Helps reduce wastage of materials that would be incurred due to poor handling or winding. 5. Diverse Applications Reduces wastage on , chain link, and welded mesh. The material is applied in agriculture, construction, and the industrial production of fencing. 6. Reduces Material Damage It reduces bending, tangles, and breakages through proper handling of the fencing materials. 7. Eco- Friendly Reduces wastage through optimum utilization and storage of the material, which goes hand in hand with the idea of being environmentally friendly. In a nutshell, a fence for businesses and professionals dealing with large-scale fencing projects, ensuring productivity, safety, and quality.

1.8 GENERAL FENCE WINDING MACHINE:

Secure Fencing is professional and best Fencing Machine Manufacturer in India. As the leading supplier of Hi-Speed Fencing Machines in India with a unique product portfolio covering the entire range of Automatic Chain Link Fencing Machine, making machine, Gabion Box Making machine, Welded Wire Mesh Machine & Wire Mesh Products. We take pride in modernizing the entire fencing industry through our automation technology and process, making us the leaders in the fencing machineries. Contact us for the latest fencing wire machine price from our online web platforms.

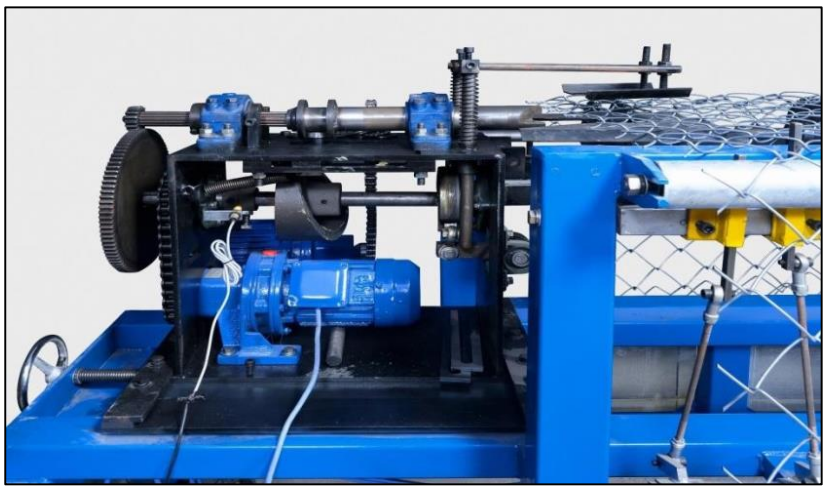

Figure 1.8 Fence Winding Machine

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE REVIEW

Avinash kumar,et.al2024 [1] The harsh terrain and remoteness of hill farming offer unique problems that frequently result in output inefficiencies and increased labor expenses for completing farm operations on time. In the present study, an attempt has been made to carry out a comprehensive review of the use of unmanned agricultural vehicles (UAVs) for addressing these difficulties and enhancing hill farming efficiency. Autonomous agricultural vehicles which are a promising tool used in farming should be highlighted for their advantages in hill farming, limitations, and future potential.

Rakesh Adakane,et.al2021[1] Generally for fencing GI (galvanized iron) wire is used. It is a zinc coated iron wire used for applications that demand longevity zinc carbon should be uniform adherent, reasonably smooth and free from impurity. More recently the technology has increased in performance and functionality for a typical modern machine. Now they have a high degree of electrical- mechanical- electronic integration so wire strand breakage has reduced but the wire quality definitely affects the efficiency of machine and hence it affects the production of fencing. Another test conducted for the testing of wire quality is the wire wrap test, the existing wire wrap test simply involves wrapping the wire into a coil, and the LTD builds on this foundation. The innovative component in the LTD test is that the resulting wrap specimen is subsequently elongated in spring tension, e.g. In a tensile testing machine, whereas the plain wrap-test is single-direction application of plastic-ductility, the LTD test applies an additional torsion stress after the work hardening episode. Once a spring is formed, the test is easily conducted in any tensile testing system, or indeed in any system (e.g. hydraulic puller) that can stretch the coil. It is important to note that the test only measures the length of the specimen: the actual force is not required. So a laboratory tensile testing machine is unnecessary.

Novrich,et.al1844 In the United States, fencing usually comes in 20-foot (6.1 m) or 50-foot (15 m) rolls, which can be joined by "unscrewing" one of the end wires and then "screwing" it back in so that it hooks both pieces. Common heights include one-foot increments from 3 feet (0.91 m) to 8 feet (2.4 m), and other heights including 3 feet 6 inches (1.07 m), 10 feet (3.0 m), and 12 feet (3.7 m) although almost any height is possible. Mesh is commonly 9, 11, or 11+½ wire gauge. Mesh length can also vary based on need, with the standard diamond size being 2 inches (5.1 cm).For tennis courts and ballparks, the most popular height is 10 or 12 feet (3.0 or 3.7 m). Tennis courts often use a diamond size of 1.75 inches (4.4 cm),[9] as measured flat side to flat side, so that power hitters cannot lodge the ball in the fence.

Mukesh Kumar,et.al2022 The filament winding (FW) technology is one of the emerging manufacturing practices with a high degree of excellence and automation that has revolutionized gas storage and transportation doctrine. Various pressure vessels have evolved in the last few decades, from metal to fiber-reinforced tanks, primarily for weight savings and high-pressure ratings; advantageously, Type 4 composite pressure vessels (CPVs) can affect fuel gas tanks' weight savings to 75% compared to metallic vessels. As a result, composite pipelines and CPV manufacturing through FW technology have proliferated. Though many design and manufacturing challenges are associated with various process factors involved in winding technology, careful considerations are needed to create a reliable product. Therefore, it is essential to comprehend the various process parameters, their combined effects, and the associated challenges while designing and fabricating filament-wound structures. This article reviews the FW technique's utility, its evolution, various process parameters, and the CPVs as an emerging contender for high-pressure gas and cryo fluid storage. In addition, different optimization techniques, numerical analysis strategies, and challenges are summarized with related disputes and suggestions.

2.2 LITERATURE SUMMARY

Evolution of Fence Winding Machines

Early Techniques and Tools (Pre-19th Century):

- Fencing initially relied on natural materials (wood, stone, hedges).
- Early wire fences were wound manually, resulting in uneven and damaged coils.

19th Century Innovations:

- **1874**: Joseph Glidden's invention of barbed wire marked a turning point in fencing technology.
- Basic manual tools, like hand cranks and spools, emerged, aiding farmers but remaining labor-intensive.

Early Mechanization (Early 20th Century):

- Mechanized tools were developed to reduce physical effort.
- Motorized models with electric drives became popular, particularly in industrial farming settings.

Portable Winding Machines (Mid-20th Century):

- Machines were designed for portability, allowing field use and on-site efficiency.
- These tools became essential for large-scale fencing projects in agriculture and construction.

Technological Advancements (Late 20th Century):

- Features like adjustable tension mechanisms and lightweight materials (aluminum, stainless steel) enhanced functionality.
- Modern machines became multifunctional, supporting diverse wire types.

Current Innovations (21st Century):

- **Automation**: Machines now feature robotic controls, tension sensors, and variable-speed motors for precision.
- **Smart Technology**: Apps and digital interfaces allow real-time monitoring and adjustments.
- **Sustainability**: Eco-friendly models minimize energy consumption and material waste.

2.3 PROBLEM IDENTIFICATION

- Traditional fence making machines are of high cost and requires more power to make fences.
- The transportation of these traditional fence making machines are hard because of their structure and fragility.
- The process of manufacturing fences in factories and transporting them to various sites adds to carbon emission.

2.4 OBJECTIVES

The objective of this project is to design and fabricate a portable, fence making machine, reducing machine cost, transportation costs (Fence), and flexibility in remote and customized fence installations.

CHAPTER 3

DESIGN OF FENCE WINDING MACHINE

3.1 METHODOLOGY

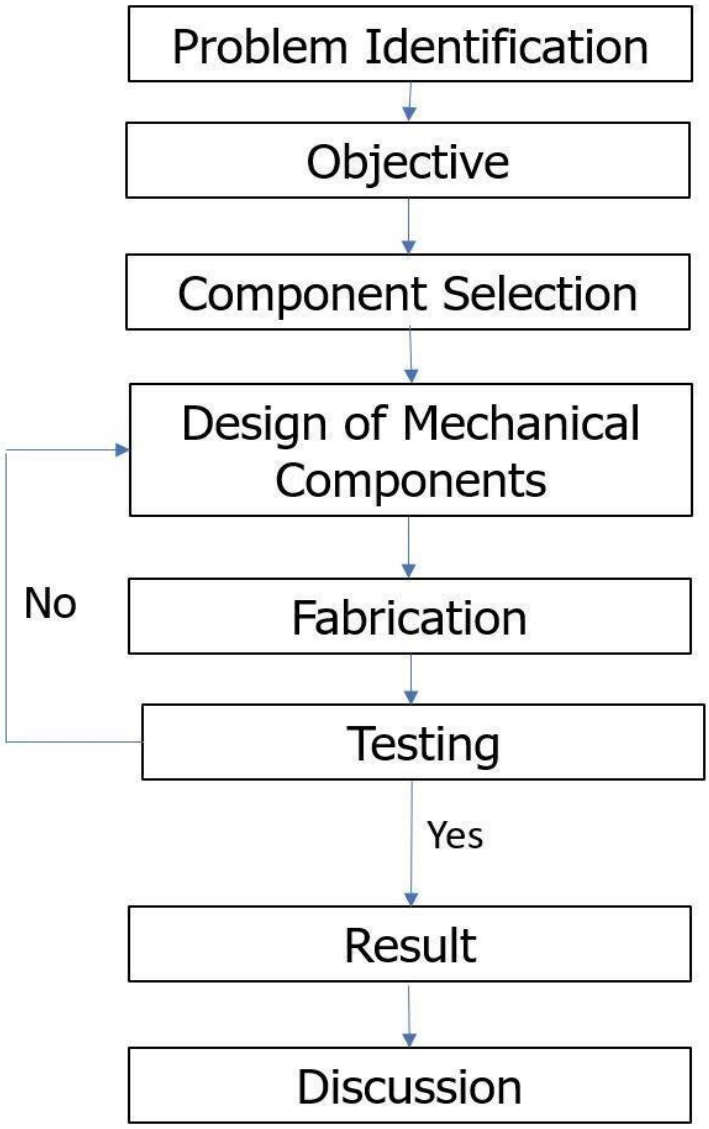

Figure 3.1 Methodology

3.2 2D DRAWING

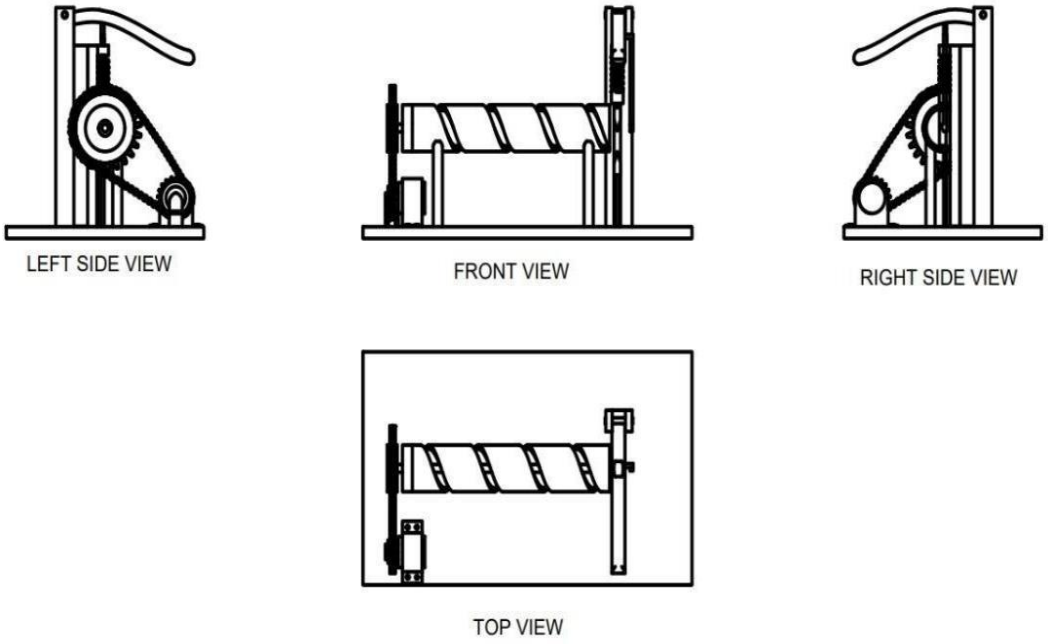

Figure 3.2 2D Drawing

3.3 3D DRAWING

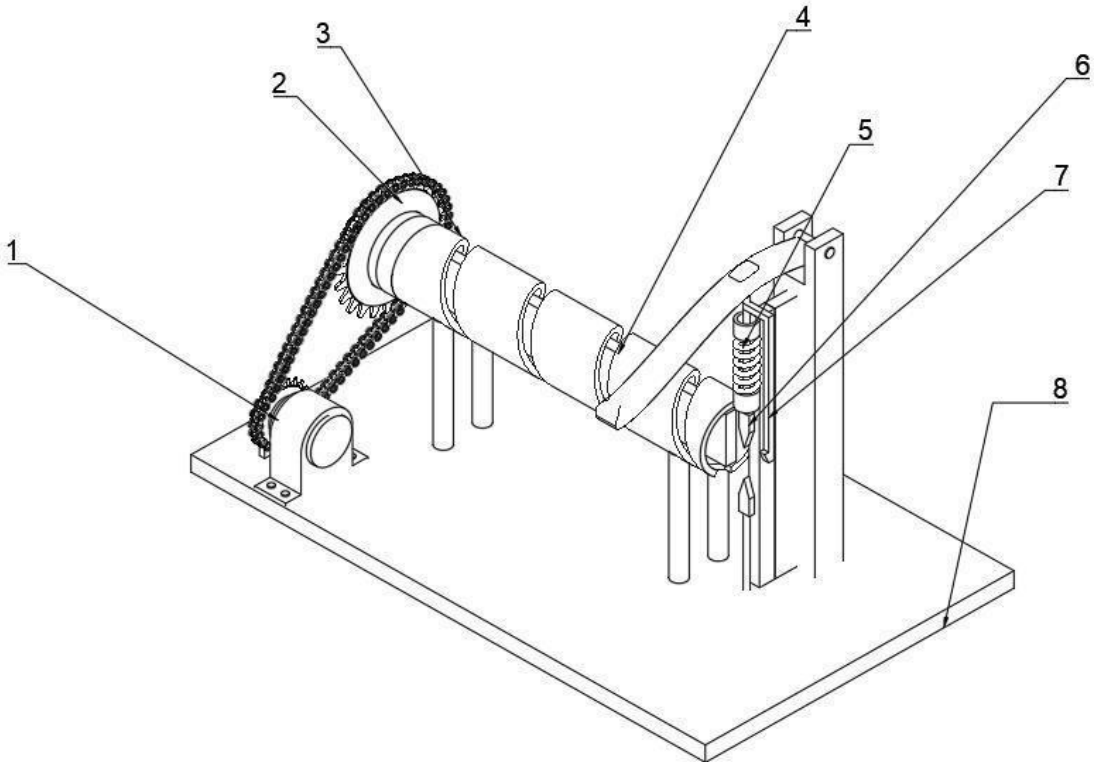

Figure 3.3 3D Drawing

1. Motor
2. Chain Drive
3. Base Tube
4. Wire Bending Plate
5. Spring

6. Cutter
7. Liting Hook
8. Base

3.4 BILL OF MATERIALS

- Motor
- Wire Bending Plate
- Chain Sprocket
- Gears
- Spiral Tube
- Spring
- Cutting Tool
- Handle
- Base Frame
- Litting Hook
- Shaft
- Base Tube
- Fence Wire

CHAPTER 4

DESIGN OF CALCULATIONS

4.1 SPECIFICATIONS OF MOTOR

Speed = 300 rpm

Voltage = 220 v

Horsepower = 0.335 hp

Material = copper

Capacity of AC motor = watts (W) /746

Watts = 250, volts = 230v

HP = 250/746

HP is approximately 0.335 horsepower

4.2 SPECIFICATIONS OF GEAR

No .of teeth on driving gear(z_1) = 42

No .of teeth on driven gear(z_2) =19

Circular Pitch(P_C) = ⊓ D/T

Diameter Pitch(p_d) =T/D

Gear ratio = Z_2/Z_1

= 19/42

=0.45

ω = $2\pi n/60$

$=2^{\frac{\pi 300}{60}}$

=31.4 rad/s

P = ω*t

Module(m)=P/T

4.3 SPECIFICATIONS OF SPIRAL TUBE

Length(l) =300 mm

Thickness(t) =4.5 mm

Material = Steel

4.4 SPECIFICATIONS OF CHAIN

Simplex Chain

Length(l) = 265 mm

Width(b) =7 mm

Pin Diameter = 3.5 mm

Pitch Distance =1.5 mm

Pin Length =9 mm

4.5 SPECIFICATIONS OF SPRING

Helical Spring

Number of turns =8

Length(l) =16 mm

Inner diameter =24 mm

Outer diameter=28 mm

Stiffness(s) = $Gd/8c^3n$

Where,

G =80*10^3 N/M^2

Mean dimeter = (inner dia+outer dia)/2

=(24+28)/2 = 26 mm

s =80*10^3*10/8*6^3*8

=46 .29N/mm

Solid Length

L_S =dn+2d

=10*8+2*10

=100 mm

Free Length

$L_F = L_S + y$

=100+3.4

= 103.4 mm

Pitch

$P= (L_F - L_S/n)+d$

= (103.4-100/10)+10

p=10.34 mm

Helix angle

$\alpha=\tan^{-1}(p/3.14*D)$

$= \tan^{-1}(10.34/3.14*26)$

$= \tan^{-1}(0.124)$

$=7.06^{\circ}$

4.6 SPECIFICATIONS OF BASE PLATE

Length =600 mm

Thicknesss =12 mm

Width(b) =450 mm

CHAPTER 5

COST ESTIMATION

S.NO	ITEM DESCRIPTION	QUANTITY	UNITCOST (RS)	ESTIMATED COST (RS)`
1	Chain drive set	1	2000	2000
2	Mild steel plate(Plate IS2062)	1	200	200
3	Mild steel rod(Rod IS2062)	2	250	500
4	Foundation Plate	1	1500	1500
5	Motor	1	650	650
6	Fabrication	-	1850	1850
7	Blasting &Painting	-	1000	1000
TOTAL				7700

CHAPTER 6

CONCLUSION

Portable fence winding machines streamline the process of collecting and storing fencing material, saving time and labor. Their lightweight and mobile design makes them suitable for agricultural, construction, or temporary fencing tasks. Proper handling and maintenance ensure their longevity and efficiency. A portable fence winding machine is designed to wind up fencing material such as wire mesh, barbed wire, or electric fencing for storage, transportation, or reuse

REFERENCES

[1] Renton D, Elbestawi MA. High speed servo control of multi-axis machine tools. International Journal of Machine Tools & Manufacture. 2000;40(4):539-59.

[2] Singh R, Vinayak H. Multi-body dynamics and model analysis of compliant gear bodies. Journal of Sound and Vibration. 1998;210(2):171-214.

[3] Menon K, Krishnamurthy K. Control of low velocity friction and gear backlash in a machine tool feed drive system. Mechatronics. 1999;9(1):33-52.

[4] Arun Kumar Yadav, S.N.V. Ganesh, Vinod Kumar Singh, Study of Stator Voltage Control Method for Induction Motor Torque Control Using MATLAB Simulation

[5] Shreekar Kulkarni, Simulation of Speed Control of Induction Motor Using V/f Method

[6] Biya Motto Fredericik, Tchuidjan Roger2, Ndzana Benoît2, Atangana Jacques3: The Control of Induction Electromotor by the Resistance Change in Rotor Circuit.

[7] Fleiter T, Gruber E, Eichhammer W, et al.: The German energy audit program for firms—a cost-effective way to improve energy efficiency? Energy Efficiency. 2012; 5(4): 447–469.

[8] Fresner J, Morea F, Krenn C, et al.: Energy efficiency in small and medium enterprises: Lessons learned from 280 energy audits across Europe. J Clean Prod. 2017; 142: 1650–1660.

[9] Han J, Yun SJ: An analysis of the electricity consumption reduction potential of electric motors in the South Korean manufacturing sector. Energy Efficiency. 2015; 8(6): 1035–1047.

[10] Hasanbeigi A, Menke C, Du Pont P: Barriers to energy efficiency

improvement and decision-making behavior in Thai industry. Energy

Efficiency. 2010; 3(1): 33–52.

[11] Javied T, Rackow T, Stankalla R, et al.: A study on electric energy consumption of manufacturing companies in the German industry with thefocus on electric drives. Procedia CIRP. 2016; 41: 318–322.

[12] Kats G, Menkin A, Dommu J, et al.: Energy efficiency financing–Models and strategies. prepared by Capital E for the Energy Foundation. 2011.

Reference Source.

[13] Kireev VM, Goltsov AB, Seminenko AS: The use of coanda effect in energy-efficient recirculating aspiration systems. In IOP Conference Series: Materials Science and Engineering. IOP Publishing. 2018; 463(3): 032020.