International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

MANUALLY FLOOR CLEANER MACHINE USING BEVEL GEAR MECHANISM

Mr. Pratik Prabhakar Wankhede[1], Mr. Ankit Ugrasen Ambade[2], Mr. Pranay Chandrabhan Bhoyar[3],
Mr. Suraj Ravindra Dakhale[4], Asst. Prof. Pratik Chaphale[5], Asst. Prof. S. Gotekar[6],Asst. Prof.Pranali Wankhede[7]

[1234]*Student, VIT, Nagpur*
[567]Asst. Prof., VIT, Nagpur

Abstract - This paper presents the design and development of a manually operated floor cleaner machine utilizing a bevel gear mechanism. The primary goal is to create an efficient, eco-friendly cleaning solution that does not rely on electrical power. The machine is designed to convert human mechanical energy into the rotational motion of cleaning brushes through the use of bevel gears, which change the direction of force application and enhance cleaning efficiency.With the advancement of technology, automated floor cleaning machines are getting more attention of researchers to make life of mankind comfortable. The concept is developing in economic countries but the reasons for non-popularity is the design complexity, cost of machines, and operational charges in terms of power tariff. In this paper, a manual floor cleaning machine is proposed. In early day a floor is clean by using a broom which is operated by human hand, in this a continuous movement of human hand is required which create fatigue and time consuming . The aim of this work is to develop and modernized process for cleaning the floor with wet and dry. This machine is capable of performing cleaning of floor in dry as well as wet condition, and it also have storage box to store a dust. This floor cleaning machine is designed by keeping the basic considerations for machine and efforts reduction, environment friendly and easy handling. The machine will work on electricity and there is no need of training to operate it. This work can be very useful to improve the life style of mankind.

Key Words: Floor Cleaner Machine, Bevel Gear Mechanism

1. INTRODUCTION *(Size 11, Times New roman)*

In the quest for sustainable and efficient cleaning solutions, the development of manually operated floor cleaner machines has gained significant attention. Traditional floor cleaning methods often rely on electrically powered devices, which, while effective, contribute to higher energy consumption and environmental impact. In contrast, manually operated machines offer a cost-effective and eco-friendly alternative, harnessing human energy to perform the cleaning task.

This paper explores the design and implementation of a manually operated floor cleaner machine utilizing a bevel gear mechanism. The primary objective is to leverage the mechanical advantage provided by bevel gears to convert the user's manual input into effective cleaning action. Bevel gears, known for their ability to change the direction of force transmission, play a crucial role in this design by transforming the vertical motion of the handle into the horizontal rotation of cleaning brushes With the help of a variety of equipment, floor cleaning has become very simple in today's world. A floor cleaning machine is a machine that cleans floors more easily and quickly than traditional cleaning methods. It's also used to cut down on human effort and time.This project's goal is to clean floors in industries, colleges, hospitals, auditoriums, malls, and workshops, among other places. The goal of this project is to design and develop a cleaning process for floors with wet and dry surfaces. The traditional method of cleaning floors with a large number of workers resulted in significant fatigue among the workers, as well as a lack of cleaning efficiency.Anyone can handle this project with ease, and no prior experience is required. It can be easily moved from one location to another. In addition, elderly people can use it to clean without feeling strained.A Multipurpose Floor Cleaning Machine is created in this project, with some basic considerations such as energy consumption, cost reduction, environmental friendliness, and ease of use.It is a major occupation throughout the world and has been since ancient times. Cleaning is essential to prevent injuries due to slips and to remove dirt. Floors are also treated to protect or beautify the surface. The correct method to clean one type of floor can often damage another, so it is important to use the correct treatment.

2. MANUALLY OPERATED FLOOR CLEANING IS DEVELOPED WITH MAJOR LIST OF OBJECTIVES:

1. To achieve simultaneous dry and wet cleaning in a single run.
2. Lower Maintenance Cost and Time.
3. Required less cleaning time.
4. Clean more space in less time.

3. THE HISTORY OF FLOOR CLEANING MACHINES

The first useful electric-powered floor machines date back to the early 1900s. Coincidentally, this was about the same time vaccum cleaners were introduced, which we discussed last month. The first floor machines were known as "dividedweight" machines. With these machines, the bulk of the weight of the machine was on

its rear wheels, which remained on the floor during operation. The buffer rolled in a push-pull fashion over the floor for both scrubbing and polishing. These early machines used brushes made of Tampico and Bassine, vegetable fibers used for centuries for floor scrubbing and polishing. To polish wood floors, carnauba wax would be applied to the floor, and then polished to a shine by going back and forth over the floor with the buffer. Divided-weight machines lacked sufficient speed, weight, and pressure over the brush to produce a high-gloss shine, and they were hard to maneuver. The major benefits for the user were that the machines were faster and less strenuous to use than polishing a floor by hand. Ultimately, the pad and chemical manufacturers introduced products that would hold up well with electric machines producing 1,500 to 2,000 rpm.

4. BENFITS OF FLOOR CLEANING MACHINE

Floor care cleaning, stripping and finishing are synonymous with time-consuming, labor-intensive and costly. With minimal resources, custodial managers are looking for products and processes that will make tackling floor care challenges simpler. According to distributors, there is equipment that can help improve worker productivity and reduce purchasing: Oscillating floor machines.

5. NEED FOR FLOOR CLEANING

The principal reasons for floor cleaning are: To prevent injuries due to tripping or slipping. Injuries due to slips and trips on level floors are a major cause of accidental injury or death. Bad practice in floor cleaning is itself a major cause of accidents. To beautify the floor. To remove stains, dirt, land, litters obstructions. To remove grit and sand which scratch and wear down the surface. To remove allergens, in particular dust. To prevent wear to the surface (e.g. by using a floor wax or protective sealant). To make the environment sanitary (e.g. in kitchen). To maintain an optimum traction (e.g. for dance floors)

6. METHOD OF FLOOR CLEANING

The treatment needed for different types of floors is very different. For safety it is most important to ensure the floor is not left even slightly wet after cleaning or mopping up. Sawdust is used on some floors to absorb any liquids that fall rather than trying to prevent them being spilt. The sawdust is swept up and replaced each day. This was common in the past in pubs and is still used in some butchers and fishmongers. It used to be common to use tea leaves to collect dirt from carpets and remove odours. Nowadays it is still quite common to use diatomaceous earth, or in fact any cat litter type material, to remove infestations from floors. There are also a wide variety of floor cleaning machines available today such as floor buffers, automatic floor scrubbers and sweepers, and carpet extractors that can deep clean almost any type of hard floor or carpeted flooring surface in much less time than it would take using a traditional cleaning method.

6. POWER TRANSMISSION

he power transmission system in a manually operated floor cleaner machine using a bevel gear mechanism is designed to convert the manual input provided by the user into rotational motion for cleaning brushes. This section details the key components and the mechanics of power transmission involved in the design.

Components of the Power Transmission System

Handle:

The handle is ergonomically designed to provide comfort and leverage. When the user pushes or pulls the handle, it transmits manual force into the system.

Input Shaft:

The handle is connected to an input shaft, which is aligned vertically. The input shaft transfers the manual force applied to the handle to the bevel gear mechanism.

Bevel Gears:

Bevel gears are crucial in changing the direction of force transmission. They are typically arranged at a 90-degree angle, allowing the vertical motion of the input shaft to be converted into horizontal motion.

The gears used in this mechanism have conical shapes and are designed to mesh perfectly to ensure smooth and efficient power transmission.

Output Shaft:

The output shaft is connected to the bevel gears. It is aligned horizontally and rotates as a result of the motion transmitted through the bevel gears.

The output shaft drives the cleaning brushes, converting the rotational motion into effective cleaning action.

Rotating Brushes:

Attached to the output shaft, the rotating brushes or cleaning pads perform the actual cleaning. Their rotation scrubs the floor surface, dislodging dirt and debris.

Mechanics of Power Transmission

Manual Input:

The user exerts force on the handle, pushing or pulling it in a back-and-forth motion. This manual input is the initial source of power for the system.

Vertical Motion to Rotational Motion:

The manual force is transmitted to the input shaft, causing it to rotate. Since the input shaft is connected to

the handle, its rotation is directly proportional to the force and speed applied by the user.

The input shaft engages with the bevel gear system. Bevel gears, positioned at an angle, change the direction of the force from vertical to horizontal. This conversion is crucial for driving the horizontal output shaft.

Gear Ratio and Efficiency:

The gear ratio between the bevel gears is selected to balance torque and speed. A higher gear ratio increases torque, making it easier to rotate the brushes but reducing speed. Conversely, a lower gear ratio increases speed but requires more force.

For manual operation, a typical gear ratio is 1:1 or 2:1, ensuring a good balance between ease of use and cleaning efficiency.

Horizontal Rotational Motion:

The horizontal output shaft, driven by the bevel gears, rotates as the input shaft moves. This rotational motion is transmitted to the attached cleaning brushes.

The brushes spin, scrubbing the floor surface effectively. The speed and efficiency of the cleaning depend on the consistency of the user's manual input.

Energy Efficiency:

The entire system is designed to minimize energy loss and maximize the transfer of manual power to the cleaning brushes. The bevel gears ensure a smooth transition of force, reducing friction and wear.

2. The body of the paper consists of numbered sections that present the main findings. These sections should be organized to best present the material.

It is often important to refer back (or forward) to specific sections. Such references are made by indicating the section number, for example, "In Sec. 2 we showed…" or "Section 2.1 contained a description…." If the word Section, Reference, Equation, or Figure starts a sentence, it is spelled out. When occurring in the middle of a sentence, these words are abbreviated Sec., Ref., Eq., and Fig.

At the first occurrence of an acronym, spell it out followed by the acronym in parentheses, e.g., charge-coupled diode (CCD).

7. BEARING

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Many bearings also facilitate the desired motion as much as possible, such as by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts principles of operation.

8. WORKING PRINCIPLE

The cleaning liquid is mixed in proper proportion and it is poured into the reservoir through the top way. The cleaning liquid is poured until the tanks are filled. Actuating the lever opens the valve. Cleaning liquid from the tank spills on the brush required amount. The brush gets drive from manual power through pulleys and belts. The brush applies pressure on the floor, when the adjuster rod is unscrewed and the handle is moved in the required direction to clean the sufficient area. Again the lever is operated to supply cleaning liquid whenever required. This process is repeated, so floor is cleaned well. The cotton brush prevents the damages on the mosaic, marble floors and gives smooth surface finish and shining.

X. ADVANTAGES □

Cleaning and polishing can be done at same time. □ It consumes less cleaning liquid. □ Power consumption is less. □ Design is very simple. □ Easy fabrication. □ It occupies less floor area. □ Net weight is less. □ Maintenance cost less. □ Easy control of cleaning solution supply. □ It can be used in various floors. □ Smoother operation. □ By further modification the drive or movement can be made automatic.

XI. APPLICATIONS □

Domestic purpose. □ Hospitals. □ Computer centers. □ Auditoriums. □ Cultural centers. □ Schools. □ Colleges. □ Large scale industries. □ Medium scale industries. □ Theatres. □ Educational institutions.

XII. LIMITATIONS

□

Vibrations will be produced when used on rough floors or surfaces. □ The washed surface has to be wiped out for thorough cleaning.

XIII. CONCLUSION

Thus our project will lead the future to go a step ahead without electricity and make changes over the new technologies. The consumption of time and human work reduces with the cleanness of environment in all over the world. Now-a-days the need of electricity is more in our day today life but this machine gives out a change over the other system, so this will help us to save the electricity for our next generation. Floor Cleaner Machine using Bevel Gear Mechanism (IJSRD/Vol.

REFERENCES

[1] Imaekhai Lawrence, Evaluating Single Disc Floor Cleaners: An Engineering Evaluation ISSN 2222-727 (Paper) ISSN 2222-2871 (Online) Vol 3, No 4, 2012.

[2] Liu, Kuotsan, Wang Chulun, A Technical Analysis of Autonomous Floor Cleaning Robots Based on US Granted Patents, European International Journal of Science and Technology Vol. 2 No. 7 September 2013, 199-216.

[3] M. Ranjit Kumar (1),N. Kapilan (2), Design and Analysis of Manually Operated Floor Cleaning Machine, International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS040912 www.ijert.org Vol. 4 Issue 04, April2015.

[4] Uman Khalid1 , Muhammad Faizan Baloch1, Smart Floor Cleaning Robot (CLEAR), Faculty of Electronic Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Pakistan.

[5] D Karunakaran, B. Abhilash, V. Ananda prasanna, Design and fabrication of hybrid floor cleaner, international journal of engg research & Tech(IJERT) ISSN:2278- 0181,Vol.5 Issue 04,april 2016.

[6] Fundamentals of Automobile Body Structure Design: Donald E. Maken.

[7] Michael R. Lindeburg, Mechanical Engineering Manual for sprocket and pinion, 2013.