Semi-Automatic Floor Cleaner

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ABSTRACT

We know that are many ways to clean floor, but all these ways take more time. Our aim is to reduce the time by “design and fabrication of a semi-automatic floor cleaning machine” and increase the productivity. By this method the operations can be performed easily. All these methods are time reducing and have to be performed easily which reduce the cleaning time. This method reduces human effort and saves the cleaning time. Apart from other methods this method can be used in places where large area need to be cleaned.

Keywords: Floor Cleaning Machine, Mechanical Sweepers

I. INTRODUCTION

1.1 CONVENTIONAL MECHANISM

The bulk of mechanical sweepers are mobile devices that gather garbage using a suction system. In most cases, the suction action is supplemented by one or more revolving brushes for dislodging residues that attach to the road’s surface. Mechanical sweepers come in a variety of style. They range in size from extremely small pedestrian-controlled devices to big mechanical sweepers mounted on a truck chassis. Large mechanical sweepers typically have an auxiliary motor to provide the suction and, in some circumstances, a hose that can be operated by an operator to pick up waste from difficult-to-reach regions. The operating speed of the smaller machines is around 2 to 3 km/hr, while that of the larger sweepers is around 10 km/hr or higher. Mechanical sweepers are effective in removing light litter, fine dust, and sand from highways [1-10].

Mechanical sweepers' usefulness in economically underdeveloped countries is limited to just assisting manual Mechanical sweepers are often seen in developing country big urban centers. The extent to
which mechanical sweepers are used for a certain application should be dependent on careful consideration of the benefits and drawbacks, as well as the costs involved with employing them vs hand sweepers. Furthermore, mechanical sweepers are notoriously difficult to keep in good working order. Internal systems may be harmed while gathering huge materials unlawfully discarded on the streets. As a result, these devices should be supported by well-equipped maintenance facilities that keep a full inventory of replacement components [11-15].

1.1. History of Floor Cleaning
The very first street sweeping machine was patented in 1849 by its inventor, C.S. Bishop. For a long time, street sweepers were just rotating disks covered with wire bristles. These rotating disks served as mechanical brooms that swept the dirt on the streets. The first self-propelled sweeper vehicle patented in the US, driven by a steam engine and intended for cleaning railroad tracks, was patented in 1868, patent No. 79606. Eureka C. Bowne was the first known woman to get a patent for a street sweeper, in 1879, patent No. 222447. "Her success was great", wrote Matilda Joslyn Gage in The North American Review, volume 136, issue 318, May 1883. In 1896, African-American inventor Charles Brooks improved on then-conventional street sweeping inventions by making the front brushes of different lengths, and by including a mechanism for collection and disposal of debris. The revolving front brushes could also be replaced with a scraper to remove snow or ice. Brooks was granted a U.S. patent for the invention in 1896. Most of the more than 300 street sweeper patents issued in the United States before 1900, including the one in Brooks' patent, had no engine on board. The wheels on the cart turned gears or chains which drove the brush and belt [16-20].

1.2. Working principle of Floor cleaning machine
Floor cleaning machine operates on the principle of chain drive mechanism. A chain drive is connected to the wheels and gear at each side. The chain is moved according to the wheel and gear. The brush moving the alternative direction of the wheels move and the brush brooms the waste present on the road also it dumps the waste into the waste-collecting box. The waste collection box is removed to dump the waste into desired places.

II. LITERATURE REVIEW
Design and fabrication of a tractor powered leaves collector machine equipped with suction-blower system”. The authors explained about the fabrication of leaves collector machine by tractor powered with suction blower system. He has framed the machine by using chassis, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634W. Design and Analysis of Manually Operated Floor Cleaning Machine” The authors have been designed and analyses manually operated floor cleaning machine. From his research he concluded the stress level in the manually operated machine is within the safe limit. Design and Development of Tricycle Operated Street Cleaning
Machine “He has developed the street cleaning machine by tricycle operated. In this research article he framed a model especially for rural area. He concluded that the cleaning is less effective where the street seems to be very rough and damaged. In this process is based on “Manual Driven Platform Cleaning Machine” Which provides the basic needs of cleaning railway station and platforms due to absence of electricity automatic cleaning machine is not suitable in every condition [21-24]. Propose a machine having multiple benefits with minimum usage of resources. The objective of the paper is to propose a machine having multiple benefits with minimum usage of resources. This is based on basic principle of science; the project is a collusion of mechanical, electrical and electronic devices. The multipurpose road cleaning machine can be used on different roads in rural and urban areas. This machine resolves the issue of dusty roads, choked pipeline, manholes, removal of metal particles from road and obstacles. Dust collector four wheeler has been designed. The main purpose is to reduce dust due to vehicle movement. This model consists of centrifugal fan absorb dust. The objective of the paper is to propose a machine having multiple benefits with minimum usage of resources. This is based on basic principle of science; the project is a collusion of mechanical, electrical and electronic devices. The multipurpose road cleaning machine can be used on different roads in rural and urban areas. This machine resolves the issue of dusty roads, choked pipeline, manholes, removal of metal particles from road and obstacles. It shows design and development of a road side cleaning machine with help of scrubber operated by petrol engine and speed application machine for collecting dust. This paper presents the design and development of road side cleaning machine in which they use scrubber operated by petrol engine and speed amplification mechanism for collecting the dust. The objective of author develop machine for cleaning roads to reduce cost, time and human efforts. The design and fabrication of streets with the help of chain drive mechanism. This paper is related to design and development of manually operated mechanical road cleaner. They used chain drive mechanism for cleaning of street [17].

III. PROBLEM DEFINITION AND SCOPE

3.1 Problem Definition
The pollution is one in all the rising and exponentially growing downside. One in all the key contributors of pollution is harmful soil dust particle. Soil dust square measure generated thanks to heavily growth of road, Construction of buildings, electrical and physical science maintenance pole in roads &etc. These dusts aren’t cleaned in time by the metropolitan staff.

3.2 Scope of the project
As per the literature survey the efficiency of semi-automatic floor cleaner brush is less, as we are changing the position of brush from vertical to horizontal grab the dust from the floor level also this can increase the efficiency cleaning . But the efficiency not only depends up on brush position but also depends up on roughens of floor .The main motto and scope of the project is to increase the efficiency of cleaning by reducing man power and to make the machine simple in construction and easy to handle.

IV. COMPONENTS OF FLOOR CLEANER
Floor cleaner consists of following major components

1. Battery
2. Motor
3. Chains sprocket
4. Wheels
5. Body frame.
6. Cleaning brush
7. Collecting bin
Battery

An automotive battery is a rechargeable battery that is used to start a motor vehicle. Its main purpose is to provide an electric current to the electric-powered starting motor, which in turn starts the chemically-powered internal combustion engine that actually propels the vehicle. Once the engine is running, power for the car's electrical systems is still supplied by the battery, with the alternator charging the battery as demands increase or decrease. An automobile battery is an example of a wet cell battery, with six cells.

Motor

A wheel is a rotating component (typically circular in shape) that is intended to turn on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines.

Chain Sprocket

Sprockets are used in bicycles, motorcycles, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the most common form of sprocket may be found in the bicycle, in which the pedal shaft carries a large sprocket-wheel, which drives a chain, which, in turn, drives a small sprocket on the axle of the rear wheel.
Cleaning Brush

A brush is a tool with bristles made of hair, wire, metal, synthetic fibers, or various natural materials that are attached to a handle made of wood, plastic, wire, or metal. Some varieties of brushes are adapted to be connected to power tools for heavy duty work such as removing paint or smoothing metals. There is an endless variety of brushes, from hair artist’s brushes to brushes that are a couple feet in diameter used to clean floors and polish metals.

Collecting Bin

A waste container, also known as a dustbin,[1] rubbish bin, trash can, and garbage can, among other names, is a type of container intended to store waste that is usually made out of metal or plastic. The words "rubbish", "basket" and "bin" are more common in British English usage; "trash" and "can" are more common in American English usage. "Garbage" may refer to food waste specifically (when distinguished from "trash") or to municipal solid waste in general.

WORKING PRINCIPLE OF FLOOR CLEANER

The working principle of a semi automatic floor cleaner involves a combination of mechanical, electrical, and sometimes electronic components. The machine's mechanism controls the movement of the machine, the cleaning brush rotates using the sprocket then the dust is thrown into the collecting bin.

V. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, modelling, designing and presenting while doing this project work. We feel that the project work is a good solution to bridge the gates between institutions and industries. We are proud that we have completed the work with limited time successfully. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. The operating procedure of this system is very simple, so any person can operate. By using more technologies they can modified and developed according to the applications.
VI. REFERENCES


[7]. J. Kumaraswamy, Anil K C, Mahadeva Reddy, Influence of Particulates on Microstructure, Mechanical and Fractured Behaviour on Al-7075 Alloy composite by FEA, Australian Journal of Mechanical Engineering (Tylor and Francis), (Scopus), Review completed, 2023


[13]. J Kumaraswamy, Vijaya Kumar, G Purushotham, Evaluation of the microstructure and thermal properties of (ASTM A 494 M


