Railway Track Cleaning Machine Using RF Module

Chetan Ramteke, Hemant Kurmate, Rana Taiwade,
Sonam Sayyad, Nahid Khan.

Anjuman College Of Engineering And Technology, Sadar, Nagpur, 440001.

Abstract—

This paper aims to design and develop a prototype for a cost efficient Railway track cleaning machine which would prove to be an alternative to the current system in place if implemented and optimized. As we see many problems of uncleanness due to waste on track, it is a human responsibility and at the same time the government has to look at the track to clean the garbage. In india, it is common for every track in which state or which station there is problem, as we have admitted that it is problem which contributes to our effort to solve or reduce to some extent. The prototype will be design having similarities to original railways. The proposed prototype is designed to clean the track, as in india as we see a very less effort is made for cleaning purpose. We are designing a machine which is automated by using radio frequency so that it can be operated in both static and dynamic conditions. Human safety is our priority; hence, project is fully automated and will be easy to operate.

Introduction:-

India is travelling towards the dream “clean and green”. Here words create no impact on people. Preaching by action is our motto; our railway track cleaning machine keeps the railway track clean. This will motivate people to keep the city clean which will helps in build a clean nation. Railway track cleaning machine is designed to provide the best cleaning facility with minimum power consumption and labour power. We are come up with this cost and power efficient prototype. Railways, by virtue of being a public transport system, are used by myriads of people and are thus littered frequently. Our main focus lies on simplifying the process of cleaning as much as possible, since tracks are to be cleaned frequently.

This prototype is designed to remove waste (plastic covers, paper cups, polythene covers, etc.) and store it in a separate cabin which would enable removal of all the wastes at once. The tracks can then be cleaned with water at high pressure, with the latter composed of an equal amount of disinfectant and pleasant smelling liquid.

Indian railways introduced a further cleaning machine designed and developed by Northern Railway capable of storing 6MT waste in March 2014. Major disadvantage of that machine is that it requires very high power due to the use of inbuilt vacuum cleaner. Secondly, that machine is built solely for the purpose of removing waste from the tracks; hence, the sides of the tracks remain unclean. That machine also requires a separate engine in place to be operational. Considerable amount of human power is also inevitable to control the working of that machine.

Last but not the least, the design of our system is different from that of the other commonly used

compartments by the Indian Railways which makes it quite complicated to manufacture in other parts of the country other than where it is developed.

The proposed prototype is designed to overcome these disadvantages by making use of technologically more improved and far efficient techniques.

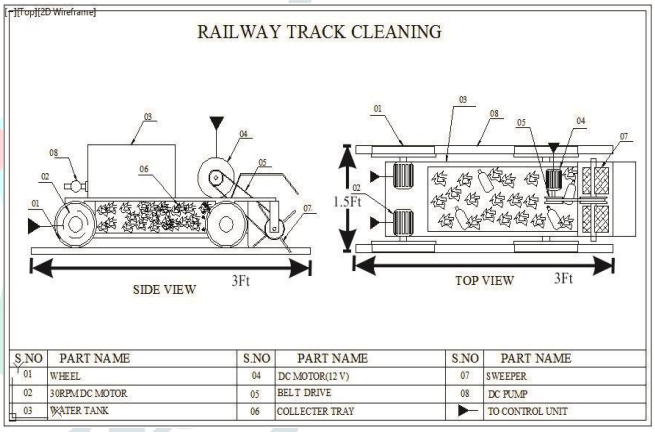
Current methods Used for cleaning Railway Tracks:-

In current system the railway tracks are cleaned by workers appointed by Indian railways. It is a very lengthy process to appoint workers for cleaning tracks. These workers have to be paid salaries for cleaning tracks and they have to travel long distance by walking to clean the tracks, hence this work is a headache for the workers and they get totally exhausted. It spends large amount of money for cleaning tracks. This system creates a mess for the workers.

Suggested method for cleaning Railway Tracks:-

This paper's main focus lies on simplifying the process of cleaning as much as possible, since tracks are to be cleaned frequently. It suggests a remote control machine for cleaning railway tracks, this will bring a drastic change in the current system for cleaning railway tracks. It is totally an automatic process which will be operated through a remote. This will help to make railway track cleaning system more efficient and preferable. It will consume very less power and will reduce the man power used for cleaning railway tracks. This will effectively reduce the cost spent for cleaning tracks by eliminating the workers appointed for cleaning tracks.

General structure:-



S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME
01	WHEEL	04	DC MOTOR(12 V)	07	SWEEPER
02	30RPM DC MOTOR	05	BELT DRIVE	08	DC PUMP
03	WATER TANK	06	COLLECTER TRAY		TO CONTROL UNIT

The railway track cleaning machine has a fabricated structure which is done by fabrication process. This system constructed mainly for the cleaning process. The machine has wheels which are run using a dc motor. The general structure of machine have cleaning tool (sweeper), container to stored the waste material, water tank to supply the water to improve the cleaning condition of the track. The movement of machine is done by giving command using RF unit.

Component Used:-

Component used in our project is described as follows:

1. Pulley.
2. DC Motor.
3. Gear.
4. RF Unit.

1. Pulley:-

We are used four well pulleys as the wheels of our prototype. These pulleys are assembled on the both ends of shaft. We made two axel as rear axel and front axel by the use of two bright rods and four pulleys. These two axels are helps to provide forward and backward movement to our machine.

2. DC Motors:-

We are used 10 RPM and 100 RPM gear DC motor to rotate the wheels of our railway track cleaning machine. The gear is mounted on shaft of the motor to transmit the power of motor to the bright rod of the wheels. Another DC motor is used to rotate the cleaning tool (sweeper) for cleaning purpose.

3. Gears:-

We used metal spur gears to transmit the power motor shaft with other shaft. Because of their shape, they are classified as a type of cylindrical gears. Generally, when two spur gears are in mesh, the gear with more teeth is called the "gear" and the one with the smaller number of teeth is called the "pinion". When two gears mesh, if one gear is bigger than the other, a mechanical advantage is produced, with the rotational speed and the torques, of the two gears differing in proportion to their diameters.

4. RF Unit:-

We had to used Radio Frequency transmitter and receiver as controlling unit of our railway track cleaning machine. These controlling consist of four channels and this channels can be used as per the requirement. RF modules are most often used in medium and low volume products for consumer applications such as garage door openers, wireless alarm or monitoring systems, industrial remote controls, smart sensor applications, and wireless home automation systems.

WORKING PRINCIPLE:-

The project consist design of railway track wheel for the purpose to run our project on railway tracks, the rear axle of the machine in power by dc motor which is connected by the gears hence to achieve higher power selection of gear drive is suited for our project. The gear drive is coupled with axle to get output torque transmitted by electric torque produce by the motor. Battery is used to run motor which intern rotate the wheel .The project is automated by use of an RF unit to attain our requirement. The structure of project is weldments as front axle is coupled with the structure, cleaning are acquired by using the plastic brushes which is mounted on light weighted shaft and it will be rotated by DC motor in which the gear system is provided.

While giving the command using RF unit, the motor rotates by power provided by battery. The electric torque produced by motor is transferred to the sprocket of gear drive rotating the real axle as rotating the wheel of the machine which leads the rotation of front axle. On which our cleaning tool (sweeper) is mounted on shaft, as the power transmitted by motor which rotate the shaft of sweeper to fulfilling our objective of cleaning off and on the railway track as this operation is automated by using the electronic RF units. The machine is used to clean, collect the waste which include plastic bottles, polyethylene papers etc, this waste material are collected in a container as provided.

Conclusion:-

This paper presents a design of the cleaning machine special for track. This system is designed by considering the drawback of the existing machine. This machine is battery charged and RF control unit is used for automatic handling of track cleaning machine. This system there will be reduction of man power needed.

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