

# Fabrication of Drainage Cleaning Machine

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**Abstract:** In this project the proposal concept is to replace the manual work in drainage cleaning by automated system. We know that water has a great importance in human being life, the water flow in drain full of wastes like polythene, bottle etc. The drains get blocked due to these wastes in water. Now a day's even through mechanical machine plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still challenging task. Drainage are using for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockage in the drainages. The government also spends too much money to clean the drainages. To overcome this problem and to save the human life we implement design "Automatic sewage cleaning system". We designed our project to use this inefficient way to control the disposal of wastages and with regular filtration of wastages. The system has a wiper motor that starts running as soon as the set-up is switched on. Two power window motors are connected to the wheel and it is driven with the help of the remote control set-up. The process starts collecting the sewage wastes by using the arm and it throws back the waste into the bin fixed in the machine at the bottom. An arm is used to lift the sewage and in turn a bucket is used to collect them. The set-up runs even in sewage area with water (limited to a particular amount) so that the wastages which floats on the water surface also gets collected. The garbage which affects the drainage is also picked up and removed. This system has limited human intervention in the process of cleaning and in turn reduces spreading of diseases to mankind.

## I. INTRODUCTION

Automatic Drainage Water Cleaning overcomes all sorts of drainage problems and promotes blockage free drains promoting continuous flow of drain water. In the modern era there have been adequate sewage problems where sewage water needs to be segregated to clean our surrounding environment. The waste and gases produced from the industries are very harmful to human beings and to the environment. Our proposed system is used to clean and control the using auto mechanism technique. In this research paper the proposed concept is to replace the manual work in drainage cleaning by automated system. Now-a-days even though automation plays a vital role in all industrial applications in the proper disposal of sewages from industries and commercials are still a challenging task. Automatic Drainage Water Cleaning overcomes all sorts of drainage problems free drains promoting continuous flow of drain water. In the modern era there have been adequate sewage problems where sewage water needs to be segregated to clean our surrounding environment. The waste and gases produced from the industries are very harmful to human beings and to the environment. Our proposed system is used to clean and control the drainage level using auto mechanism technique. Drainage pipes are using for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage pipes.

Drain pipes are used for the adequate disposal of waste and unfortunately sometimes there may be a threat to human life during the cleaning of blockage in the drain pipes or it can cause serious health issues because of the pertaining problems like malaria, dengue, etc. In order to overcome this problem as well as to save human life we implement a design.

As long as the draining system is considered the function of the main drainage system is to collect, transport and dispose of the water through an outfall or outlet. Impurities in drainage water can be only like empty bottles, polythene bags, papers, etc. The problem such as Environmental pollution and spreading of viral diseases are avoidable. Automation of Drainage Cleaning System would reduce the risk of various diseases spread due to accumulation of waste. This Drainage Cleaning system will clean the waste at the surface of drainage which would allow the flow of water. Floating in drain are lifted by teeth which is connected to chain. When motor runs the chain starts to circulate making teeth to lift up. The waste materials are lifted by teeth and are stored in waste storage tank.

## II. RELATED WORK

Ganesh U L, showed the usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this problem, they implemented mechanical semi-automatic drainage water cleaner and so the water flow is efficient because of regular filtration of wastages with the help of that project. Different kinds of environment hazards reduced with the help of Drainage system machine. [1]

James C. Conwell, G. E. Jhonson proposed the design and construction of a new test machine configuration that offers same advantages over the traditional one. The new machine and attendant instrumentation provide more realistic chain loading and allow link tension and roller sprocket impact monitoring during normal operation. The incorporation of idle sprocket allows independent adjustment of test on length and preload.[2]

S D Rahul Bharadwaj, Proposed with the automatic cleaning of waste water in order to prevent global warming and melting of glaciers. The results emphasize the need of waste water treatment plants, through which the water is treated before suspending in rivers. Firstly power is generated and that power is used for waste water cleaning process . [3]

Balachandraetal, Reviewed about drainage cleaning to replace manual work to automated system because manually cleaning system it is harmful for human life and cleaning time, is more so to overcome this problem they implemented a design “Automatic drainage water pump monitoring and control system using PLC and SCADA”. PLC controller from Siemens was used in the treatment system of drainage wastewater control by the stepper motor, compressor, gas exhauster, pressure valve and the liquid level, flow and other analog variables to achieve automatic control of sewage waste water treatment. [4]

Dr .k.kumaresan explained manual work converted to automated system. Drainage pipe using for disposal and it may be loss for human life while cleaning the blockage in the drainage pipes. To overcome this problem they implemented “Automatic Sewage Cleaning System”. This project may be developed with the full utilization of men, machines, and materials and money. They made their project economical and efficient with the available resources. They used automation technology related with his application of mechanical, electronics, computer based systems to operate and control production. [5]

R.Sathiyakala, explained E bucket (electronic bucket) use for drainage cleaning system because E-bucket lifted a sewage and used evaporation treatment for this sewage wet sewage was converted into dry matters, with the of ARM board (ARDUINO) this process was performed. After this process they were add this waste a government bank without any kind of affection of the bacteria. [6]

Nitin Sall, explained flow of used water from homes, business industries, commercial activities is called waste water. 200 and 500 liters wastage water are generated each person every day. So using waste water technology that removes, rather than destroys, a pollutant in a drainage system. [7]

NDUBUISI C. Daniels, et.al. Showed the Drainage system cleaner machine used to remove garbage and sewage automatically which helped to protect the environment from different kinds of environmental hazards. The drainage system cleaner has three major parts which are the Propeller, the Cleaner and the Pan all makes up for its effective functioning. [8]

### III. PROPOSED METHODOLOGY

Drainage are using for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockage in the drainages. The government also spends too much money to clean the drainages. To overcome this problem and to save the human life we implement design “Automatic sewage cleaning system”. We designed our project to use this inefficient way to control the disposal of wastages and with regular filtration of wastages. The system has a wiper motor that starts running as soon as the set-up is switched on. Two power window motors are connected to the wheel and it is driven with the help of the remote control set-up. The process starts collecting the sewage wastes by using the arm and it throws back the waste into the bin fixed in the machine at the bottom. An arm is used to lift the sewage and in turn a bucket is used to collect them. The set-up runs even in sewage area with water.

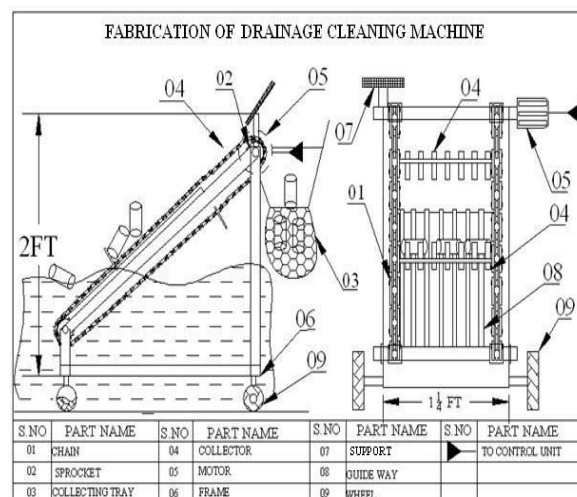


Fig:3.1 Fabrication Of Drainage Cleaning Machine

**WORKING**

Here we were fabricating of drainage cleaning machine. Here the collecting plate and chain drives are rotating continuously by the motor using battery power. The collecting plate is coupled between the two chain drives for collect the waste materials from the drainage. Then the collected wastages are thrown on the collecting tray. Our project is having wheels for movable application.

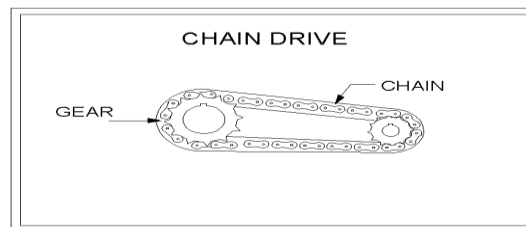
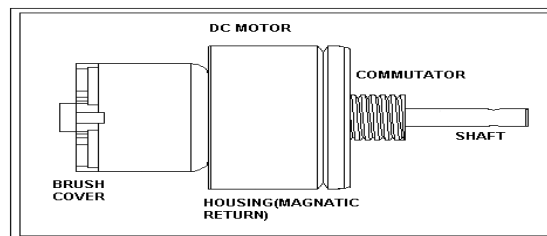
**DESCRIPTION OF EQUIPMENTS****3.1.RELAY**

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off. So relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. The link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

**3.2. CHAIN DRIVE**

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. The power is conveyed by a roller chain, known as the drive chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force.

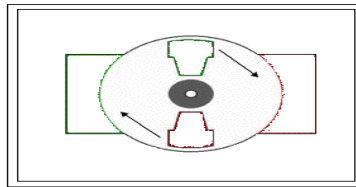
**3.3.D.C.MOTOR****3.3.1.PRINCIPLES OF OPERATION**

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

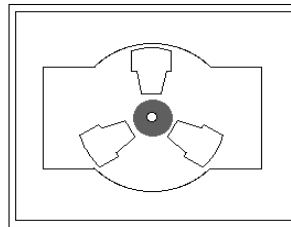
Every DC motor has six basic parts -- axle, rotor (armature), stator, commutator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings

(generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets. The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. Given our example two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating.

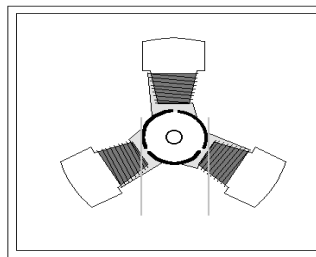
In real life, though, DC motors will always have more than two poles (three is a very common number). In particular, this avoids "dead spots" in the commutator. You can imagine how with our example two-pole motor, if the rotor is exactly at the middle of its rotation (perfectly aligned with the field magnets), it will get "stuck" there. Meanwhile, with a two-pole motor, there is a moment where the commutator shorts out the power supply. This would be bad for the power supply, waste energy, and damage motor components as well. Yet another disadvantage of such a simple motor is that it would exhibit a high amount of torque "ripple".



So since most small DC motors are of a three-pole design, let's tinker with the workings of one via an interactive animation (JavaScript required):



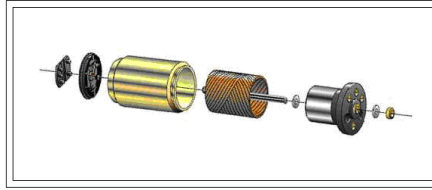
A few things from this -- namely, one pole is fully energized at a time (but two others are "partially" energized). As each brush transitions from one commutator contact to the next, one coil's field will rapidly collapse, as the next coil's field will rapidly charge up (this occurs within a few microsecond). We'll see more about the effects of this later, but in the meantime you can see that this is a direct result of the coil windings' series wiring:



There's probably no better way to see how an average DC motor is put together, than by just opening one up. Unfortunately this is tedious work, as well as requiring the destruction of a perfectly good motor. The guts of a disassembled Mabuchi FF-030-PN motor (the same model that Solarbotics sells) are available for (on 10 lines / cm graph paper). This is a basic 3-pole DC motor, with 2 brushes and three commutator contacts.

The use of an iron core armature (as in the Mabuchi, above) is quite common, and has a number of advantages. First off, the iron core provides a strong, rigid support for the windings -- a particularly important consideration for high-torque motors. The core also conducts heat away from the rotor windings, allowing the motor to be driven harder than might otherwise be the case. Iron core construction is also relatively inexpensive compared with other construction types. But iron core construction also has several disadvantages. The iron armature has a relatively high inertia which limits motor acceleration. This construction also results in high winding inductances which limit brush and commutator life.

In small motors, an alternative design is often used which features a 'coreless' armature winding. This design depends upon the coil wire itself for structural integrity. As a result, the armature is hollow, and the permanent magnet can be mounted **inside** the rotor coil. Coreless DC motors have much lower armature inductance than iron-core motors of comparable size, extending brush and commutator life.



The coreless design also allows manufacturers to build smaller motors; meanwhile, due to the lack of iron in their rotors, coreless motors are somewhat prone to overheating. As a result, this design is generally used just in small, low-power motors. Beamers will most often see coreless DC motors in the form of pager motors. Again, disassembling a coreless motor can be instructive -- in this case, my hapless victim was a cheap pager vibrator motor. The guts of this disassembled motor are available (on 10 lines / cm graph paper). This is (or more accurately, was) a 3-pole coreless DC motor.

### 3.4. SPROCKET

Sprocket is a profiled wheel with teeth that meshes with a chain. It is intended material. It is distinguished from a gear in the sprockets are never meshed together directly. The drive sprocket and may be positioned at the front or back of the vehicle. Sprockets are never meshed together directly, and from a pulley by not usually having a flange at each side. Transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track.

### 3.5. SPUR GEAR

Spur gears are the simplest and most common type of gear. Their general form is a cylinder or disk. The teeth project radially, and with these straight-cut gears, the leading edges of the teeth are aligned parallel to the axis of rotation. These gears can only mesh correctly if they are fitted to parallel axes. The torque ratio can be determined by considering the force that a tooth of one gear exerts on a tooth of the other gear. Consider two teeth in contact at a point on the line joining the shaft axes of the two gears. The force will have both a radial and a circumferential component. Gears are a very useful simple machine. The torque ratio can be determined by considering the force that a tooth of one gear exerts on a tooth of the other gear. Consider two teeth in contact at a point on the line joining the shaft axes of the two gears.



A gear is component within a transmission device. Transmit rotational force to another gear or device. A gear is different from a pulley in that a gear is a round wheel. Mesh with other gear teeth, allowing force to be fully transferred without slippage. Depending on their construction and arrangement, geared devices can transmit forces at different speeds, torques, or in a different direction, from the power source. Gears are a very useful simple machine. The most common situation is for a gear to mesh with another gear, but a gear can mesh with any device having compatible teeth, such as linear moving racks.

## IV. LIST OF MATERIALS

### FACTORS DETERMINING THE CHOICE OF MATERIALS

The various factors which determine the choice of material are discussed below.

#### 4.1. PROPERTIES

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied. Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection

- Physical
- Mechanical
- From manufacturing point of view
- Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc. The various Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc.

#### 4.2. MANUFACTURING CASE

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

#### 4.3. QUALITY REQUIRED

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

#### 4.4. AVAILABILITY OF MATERIAL

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

#### 4.5. SPACE CONSIDERATION

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

#### 4.6. COST

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored. Sometimes factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.

### V. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. Smoother and noiseless operation by the medium of "FABRICATION OF DRAINAGE CLEANING MACHINE". This project "FABRICATION OF DRAINAGE CLEANING MACHINE" is designed with the hope that it is very much economical and help full to many apartments, hotels and houses. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

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