

# FABRICATION of RECIPROCATING MULTISPRAYER

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**ABSTRACT:** As we know that the India has been known by an agricultural based country. Directly or indirectly about 75% of India's population is dependent upon agriculture and our farmers are using same old conventional methods and equipments like reaping, spraying, seed weeding, sowing etc. The aim of developing such concept is to prevent the 3 major drawbacks of the pump being used currently-1<sup>st</sup> the user has to carry whole loaded tank with pump on his back and his shoulder (approximately 20 to 25kg). 2<sup>nd</sup> The user has to continuously pump the handle by one hand, 3<sup>rd</sup> due to less precautions taken by the user he may come in direct contact with the chemicals and thus results in fatal deceases. To control the deceases, insects and weeds in the crops chemicals are widely used. These chemicals are costly.

Thus, equipment for uniform and effective application is essential. In this work we have suggested equipment which is wheel operated. This wheel operated multi-sprayer equipment avoids pesticide coming from front of nozzles which will come in contact with the user. Hence these efforts are made to design and develop to perform operation without using any electrical power.

**Key words:** - Usability, Functionality, Ergonomics, Wheel Driven, Multi Nozzle.

## INTRODUCTION

Farming is the backbone of economy of our country. In this agricultural sector, there is lot of field work to do such as sowing, reaping, weeding etc. Except from these above operations, spraying is very important operation to protect the cultivated crops from the insects, pests, funguses and diseases for which various nutrients pesticides, insecticides, fungicides are sprayed for protection. In last 50 years farming has undergone a great revolution. Insects are largely responsible for destruction of crops. Manmade insecticides or pesticides or natural preparations are used to prevent or control the reproduction of insects or to terminate them. The pesticides, herbicides and fertilizers are applied to agricultural crops with the use of sprayers. With minimum efforts these provides optimum performance.

In this sector, the effective spraying and weeding with cheap and beneficiary equipment are used for increase in productivity for better contribution of India's GDP which is very important. The principles of motion of project that transmits rotary motion of chain drive and sprocket arrangement and reciprocating piston pump for pumping and spraying pesticides or fertilizers over the field.

Usually cheap knapsack sprayer is carrying certain major drawbacks such as back pain, arm pain due to continuous pumping of fluid and exertion of user due to its heavy weight. Manually operated hand pumping isn't uniform and may generate uneven pressure inside the tank. The flow becomes turbulent due to fluctuation in pressure in tank which is undesirable. As there is an increase in pressure in cylinder, spray width increases. This results in pesticides waste.

## LITERATURE REVIEW

Pesticides are used to protect field crops and orchards. Pesticides are used to destroy, prevent or control diseases and insects of field crops and orchards on farm. In an average year, especially in summer, one or more types of irrigators will be used by an average family gardener. Among the many available products, it is important to select efficient and for particular need, if applying fungicides, insecticides and herbicides, liquid or moisturizing fertilizers agents. E.g. the lawn sprayer is specially designed for the application of liquid materials in the turf area. They are dosed to allow quickly mixing and coarse spray, so it takes less time to apply herbicides, insecticides, etc.

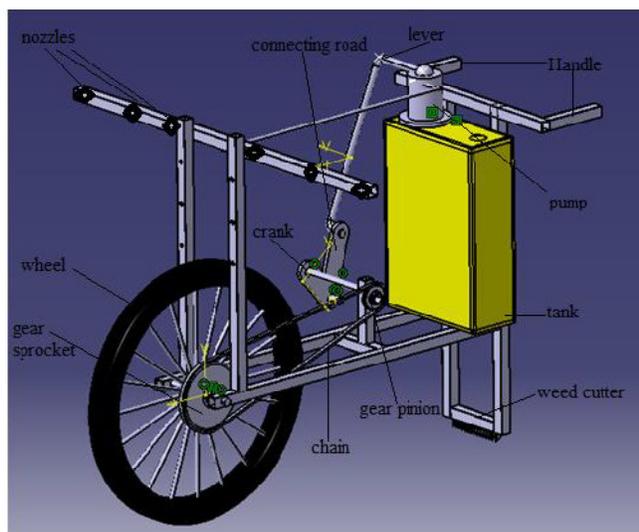
Furthermore, there are not many possibilities to drift in the liquid in the beds of nearby shrub beds and flowers. Efficiency and accuracy vary significantly, especially with the one that connects to the garden hose. Atomizers which are used to kill weeds or to apply any type of soil, infertility should not be used for other purposes. In fact, it will be a good practice to set aside a sprayer just for lawn area. Use one separately flowers and bushes. It is a good idea to clean multi sprayer immediately after usage for fumigation type. Small soapy water moved through the sprayer and then rinsed with warm water helps well.

**Key component:-**

Sr. No.	Component Name	Material
1	Chassis	Mild Steel
2	Tank	Plastic
3	Nozzle	Plastic
4	Nozzle Bar	Steel
5	Adjuster Bar	Steel
6	Link	Mild Steel
7	Disc	Mild Steel
8	Wheel	Steel
9	Tyre	Rubber
10	Sprocket	Steel
11	Free Wheel	Steel
12	Spur Gear big	Mild Steel
13	Spur Gear small	Mild Steel
14	Shaft	M.S. Bright bar
15	Shaft	M.S. Bright bar

**WORKING PRINCIPLE and WORKING**

1. Motion is transmitted with the help of arrangement of chain and sprockets.
2. Slider crank mechanism is used to convert the rotary motion to reciprocating motion.



The previous figure shows the assembly of the alternative agricultural multi-sprayer. After grabbing the handle by an operator and the cycle is pushed forward while the wheel progresses, the wheel turns. As the wheel rotates, the gear sprocket situated on the wheel also rotates at same rpm with the wheel. The movement of the gear sprocket is transferred to the pinion through the chain drive. The pinion and the crank are mounted on both sides of the same axis, the rotary movement of the shaft becomes the reciprocating movement with the

help of the crank and the mechanism of the connecting rod which is also connected to the lever and therefore the lever and oscillates at the fulcrum. The cylinder associated with the support creates an elective development in the barrel and the required weight is come to. The pesticide tank sucks the barrel and the cylinder constrained the pesticide to be tossed through the tube; the quantity of spouts is associated with shower the pesticide. We can alter the weight, what is important to shower with the assistance of an extraordinary course of action is to change the length of the wrench by giving scores in the wrench. A few changes can be made in the coupling of the interfacing bar and the free turn of the situation of the wrench or nonpartisan. Utilizing these settings, pumping stops and the wheel turns openly when pesticides are not expected to shower. The tallness, position and point of the spout can be flexible.

**CONSTRUCTION**

Following are the parts used in project:

1. Shaft
2. Wheel
3. Chain and Sprockets
4. Crank Mechanism
5. Sprayer tank
6. Nozzle

**1. SHAFT**

A drive shaft is a segment for transmission of torque & rotation, normally used to associate other parts of a drives mechanism that can't be associated specifically due to remove or the need to consider relative movement in between. The torque bearers, drive shafts are liable to shear and torsional stress, like the diff between the torque input and load. They should be solid enough to hold up under the stress, while staying away from expansive extra weight as that would increase in inertia.



**Fig. Shaft (axle)**

**2. WHEEL**

A wheel is a roundabout component that can be pivoted on a hub bearing. The wheel is one of the principle segments of the haggle which is simple to pivot. Wheels in addition with axles enable overpowered burden to be moved effectively or transportation while encouraging load, or on the

other hand performing work in machines. A wheel moreover decreases the grinding by encouraging movement to rolling together with the utilization of wheel axles.



Fig. Wheel

### 3. CHAIN AND SPROCKET

Chain drive is a method for transmitting mechanical control starting with one place then onto the next place. It is regularly used to convey energy to the wheels of a vehicle. Most regularly, the power is dispatched by a roller chain, known as the drive chain or transmission chain disregarding a sprocket adapt, with the teeth of the outfit fitting with the openings in the connections of the chain.

The apparatus is turned, and this powers the chain putting mechanical power into the framework. A toothed wheel or a wheel is an added wheel with toothed pinions or pinions that work with a chain or notched material. The sprocket applies for the most part to any wheel upon which outspread projections connects with a passing over chain.

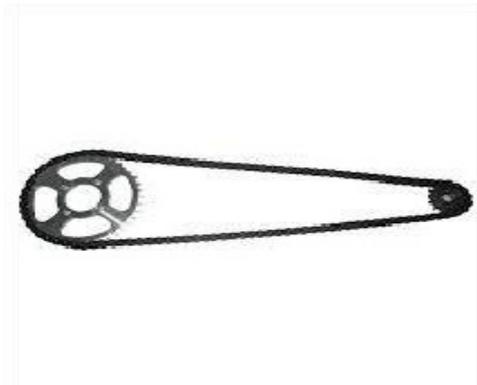


Fig. Chain sprocket

### 4. CRANK

A crank is an arm joined at a pivoting shaft through which reciprocating movement is conceded from the shaft. This component is utilized to change over circular motion into reciprocating movement. One end of the connecting rod which

is attached to crank gives circular motion, while opposite end is moved in direct sliding motion.

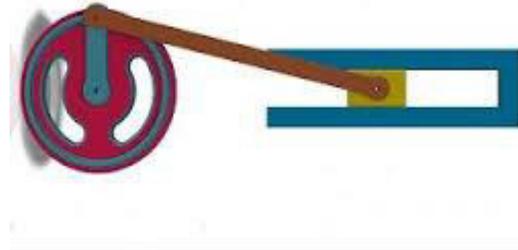


Fig. Crank (Mechanism)

### 5. SPRAYER TANK

The tank ought to be made with ability of resistant to corrosion material. Materials utilized as a part of sprayer tanks incorporate stainless steel, polyethylene plastic and filaments. Pesticides might be corrosive to specific materials. Aluminum, steel tanks ought not be utilized. A few chemicals respond with these materials, which may bring about diminished adequacy of the pesticide, or rust or erosion inside the tank. Tanks should be kept clean and free of rust, dampness and different contaminants which can harm the pump and spouts. Likewise, defilement may gather in the spout and confine the stream of Chemical, bringing about ununiform spray patterns and rates of use. The tank ought to be perfect in the wake of splashing is finished. A tank ought to give a deplete gap at the base close to one end permits complete drainage.

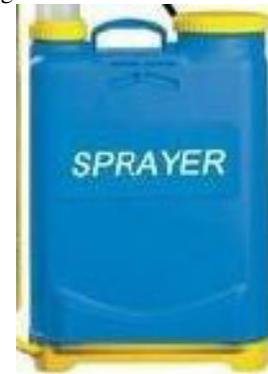


Fig. Sprayer Tank

### 6. NOZZLE

The nozzle is a main component of any spraying system. It performs many important functions such as:

1. Flow regulation.
2. To convert mixture fluid into droplets.
3. As the desired pattern the spray disperses.

Nozzles are produced using a few kinds of material, for example, ceramics, hardened stainless steel, plastic, nylon, brass, stainless steel,. Nozzles are produced using harder metals for the most part cost more but wear longer. Every

nozzle on a sprayer ought to apply a similar measure of pesticide. In the event that one nozzle applies pretty much than abutting nozzles, streaking happens. Nozzle stream rates should be checked by consistently gather to the spill out of every nozzle under working conditions and think about the yield. The nozzle is ought to be expelled from the nozzle body and cleaned it with a delicate swarmed nozzle cleaning brush. A decent strategy is blowing out dirt with the use of compressed air.



**Fig. Nozzle**

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## CONCLUSION

The goal of our project was to satisfy the need of farmer's trouble from the issues of expanding expense of Fertilization, work cost and accessibility as it is worked by single individual. This project is a push to satisfy the whole necessity examined before. The wheel operated reciprocating pump is entirely outlined thinking about all the mechanical terms that are identified with design of pump. The reciprocating pump is mounted on tank and that is the reason they can be transported effortlessly. All things points towards the less exertion required to work the pump. The pump is light duty equipment for spraying pressurised fluid through nozzle. It lessens labor for task. Max amount of fluid can be conveyed (up to 25 lit. based upon tank size) and furthermore can be used. It can shower on tall trees with movable nozzles. To create more yield from the farm and furthermore it gives greater efficiency in less input. By utilizing this system we can minimize the endeavors of works and constantly spray the pesticides and fertilizers everywhere throughout the farm.

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