

# WATER PUMP USING GEAR ARRANGEMENT

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**Abstract** – The major problem for the agriculturists at the present scenario is the Energy crisis. The major source of water for the fields is wells and bore wells. People use pumps to pump out water from wells and bore wells. This process involves lot of energy consumption every day. Our project deals with the process of pumping out water from wells and bore wells using a specially designed gear arrangement and crank mechanism. Our setup does not require any electrical devices and thus thereby the losses are avoided.

**Keywords** –Connecting Rod, Disk, Hand Pump, Spur Gear , Wooden pieces.

## I. INTRODUCTION

Water pumping innovation created in parallel with the wellsprings of energy accessible at the time. To be sure one can state that our first progenitors who measured their hands and lifted water from a stream picked the "pumping" system suitable to them. For little groups in creating nations, human and creature power is frequently the most promptly accessible power for pumping water, especially in rustic regions. An extensive variety of pump sorts is accessible available. Winning nearby conditions and administration limits decide the sort that is most appropriate and maintainable. While it might appear glaringly evident that viable inclusion of clients, the private area and bolster associations is essential in the decision of pumping innovation, the reality remains that it is much of the time slighted. Time and again specialized limits of clients and nearby support are over-evaluated, bringing about pumps not being appropriately worked and kept up, and in the end to their breakdown.

Support by delegates of the distinctive client bunches, including ladies and offspring of various ages, in choosing and experimenting with the pumps, guarantees that a sort is picked that is appropriate and worthy to them. Beneficial utilization of the pumped water for the most part has an exceptionally constructive outcome on the upkeep and lifetime of the pump. It likewise helps when clients find out about the correct method for working a particular kind of pump and the basic reasons, and set up and actualize a framework for legitimate operation as a major aspect of neighborhood participatory arranging and administration of the administration. At the point when nearby premium is not produced, absence of neighborhood assets or motivating forces to put resources into O&M and substitution of pumps implies that their condition worsens rapidly.

## II. WORKING METHODOLOGY

This project is mainly operated by the gear system and also using crank mechanism. We will rotating handle at one times to the disk is rotating at 20 times through the gear arrangement. The disk shaft is connected through

the gear box and the disk is connected with the top side of the piston rod through the connecting rod.

when we rotating the handle, then 80 teeth gear start to rotate, it's connected to the 16 teeth gear, when will 80 teeth gear rotate one revolution to 16 teeth gear will be rotate at 5 times. Then 16 teeth and 60 teeth gear connected together, so 60 teeth gear rotate simultaneously , and it is connected with the another 16 teeth gear, one revolution of 60 teeth gear is equal to 3.75 times of 16 teeth gear. The 16 teeth gear shaft is connected with the disk, so the gear and disk rotate together.

In a cylinder pump, the cylinder is fitted with a non-return valve (the cylinder valve) and slides vertically here and there inside a chamber that is likewise fitted with a non-return valve (the foot valve).The circle is pivoting to the cylinder is proceed onward upward and descending. At the point when the cylinder moves upwards, the cylinder valve closes and a vacuum is made underneath it, making water be drawn into the barrel through the foot valve, which opens. All the while, water over the cylinder, held up by the shut cylinder valve, is uprooted upwards.

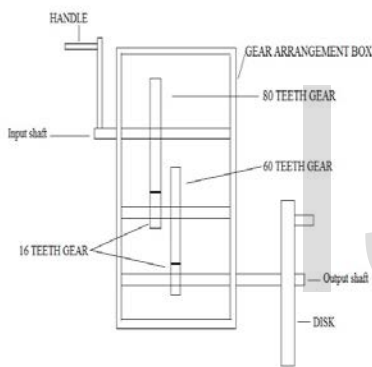
In a straightforward suction pump it develops through the conveyance outlet; in a pump with a submerged barrel it is constrained up the rising principle. At the point when the cylinder moves downwards, the foot valve closes, forestalling reverse, and the cylinder valve opens, permitting the cylinder to move down through the water in the cylinder.

The main concept of the project is mainly operated by gear arrangement.

The gear ratio is 1:5:20.We rotate the handle at one time, then the disk will be rotate at 20 times. So we can easily get a high output.

**Input Gear box working Disk rotating using pump connecting rod output.**

S.No.	Name of the Component	No. of Quantity
1	HAND PUMP	1
2	16 TEETH SPUR GEAR	2
3	80 TEETH SPUR	1
4	60 TEETH SPUR GEAR	1
5	DISK	1
6	CONNECTING ROD	1
7	WOOD PIECES	5 NOS



GEAR BOX ARRANGEMENT

**III.MAIN PRINCIPLE OF HAND PUMPS**

There are a wide range of sorts of hand pump[1]. Be that as it may, the vast majority of them are certain relocation pumps and have responding cylinders or plungers. In a cylinder pump[1], the cylinder is fitted with a non-return valve (the cylinder valve) and slides vertically here and there inside a chamber that is likewise fitted with a non-return valve (the foot valve). Raising and bringing down the handle of the pump causes vertical development of pump poles that are associated with the cylinder. At the point when the cylinder moves upwards, the cylinder valve closes and a vacuum is made beneath it, making water be drawn into the barrel through the foot valve, which opens. At the same time, water over the cylinder, held up by the shut cylinder valve, is dislodged upwards. In a basic suction pump it develops through the conveyance

outlet; in a pump with a submerged chamber it is constrained up the rising primary.

**IV.CHOICE OF HAND PUMP**

The proposals for hand pumps[3] that are proposed for use in group based water supply ventures have been set out obviously in the World Bank/UNDP Hand pumps Project . And also the fabricate and execution determinations, the VLOM standards plot many credits identifying with simplicity of support, nearby produce, strength, institutionalization,

low capital cost and working costs, accessibility of extras, and group administration and upkeep.

While considering the most fitting pump for a specific venture, it is additionally essential to consider nearby inclinations and government arrangement. Pumps and their extras ought to be unreservedly accessible in neighborhood advertises as a pre-essential for simplicity of support and substitution. Imported or gave pumps that are not accessible in the nearby markets are along these lines considered unseemly.

**Pump selection criteria**

In selecting a pump type for a specific purpose the following technical criteria need to be considered:

- Quantity of Discharge required
- Head Distance from pumping level to delivery level
- Variations expected in water levels at the source
- Durability of basic components (including corrosion resistance)
- Weight of below ground parts
- Availability and cost of spares
- Ease of maintenance

**V.PROJECT EQUIPMENT PURPOSE**

**Spur gear**

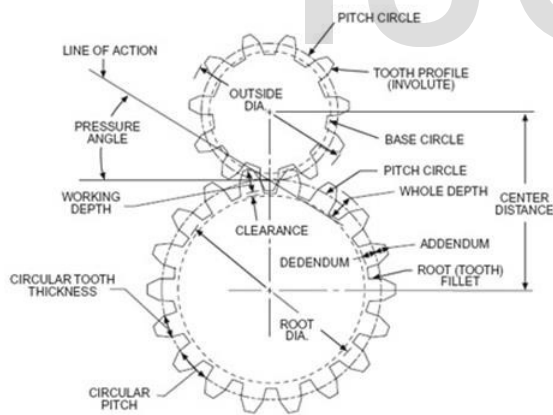
Spur gears[2] are the most widely recognized kind of apparatuses. They have straight teeth, and are mounted on parallel shafts. Here and there, many goad apparatuses are utilized without a moment's delay to make substantial rigging decreases. Goad riggings are utilized as a part of numerous gadgets that you can see all over, similar to the electric screwdriver, moving beast,

swaying sprinkler, windup wake up timer, clothes washer and garments dryer. Be that as it may, you won't discover numerous in your auto.

This is on the grounds that the Spur Gears can be noisy. Each time a rigging tooth draws in a tooth on the other apparatus, the teeth impact, and this effect makes a clamor. It additionally builds the weight on the apparatus teeth.



## SPUR GEAR



### Spur Gear Terminology

#### PITCH CIRCLE

It is an imaginary circle which by pure rolling action would give the same motion as the gear.

#### CIRCULAR PITCH

It is the distance measured on the circumference of the pitch circle from a point of one tooth to the corresponding point on the next tooth. It is usually denoted by pC.

#### PRESSURE ANGLE

It is the angle between the common normal to two gear teeth at the point of contact and the common tangent at the pitch point. The standard pressure angles are 14 1/2 degree and 20 degree.

#### ADDENDUM

It is the radial distance of a tooth from the the pitch circle to the top of the tooth.

#### DEDENDUM

It is the radial distance of a tooth from the pitch circle to the bottom of the tooth.

#### CLEARANCE

It is the radial distance from the top of the tooth to the bottom of the tooth, in a meshing gear. A circle passing through the top of the meshing gear is known as clearance circle.

#### TOOTH THICKNESS

It is the width of the tooth measured along the pitch circle.

#### PROFILE

It is the curve formed by the face and flank of the tooth.

#### Advantages of Spur Gear

1. Spur gears have high power transmission proficiency.
2. They are minimized and simple to introduce.
3. They offer consistent speed proportion.
4. Not at all like belt drives, goad equip drives have no slip.
5. Spur gears are exceptionally dependable.
6. They can be utilized to transmit substantial measure of energy .

#### Disadvantages of Spur Gear

1. Spur adapt drives are exorbitant when contrasted with belt drives.
2. They have a constrained focus separate.
3. This is on the grounds that in a spur outfit drive, the gears ought to be coincided and they ought to be in direct contact with each other.

4. Spur gears deliver a ton of clamor when working at high speeds.
5. They can't be utilized for long separation control transmission.

### Applications of Spur Gear

Spur gears have a wide range of applications. They are used in:

1. Metal cutting machines
2. Automobile gear boxes
3. Marine engines
4. Fuel pumps
5. Washing Machines
6. Gear motors and gear pumps.

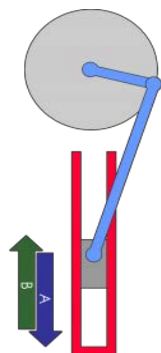
### SLIDER CRANK MECHANISM

The slider crank mechanism is a specific four-bar linkage arrangement that believes direct movement to rotational, or the other way around. Inner burning motors are a typical case of this component, where ignition in a chamber makes weight which drives a cylinder. The cylinder's straight movement is changed over into rotational movement at the wrench through a common connection, alluded to as the associating bar. As the geometry of the wrench drives the transformation of direct movement to rotational, shaking strengths are produced and connected to the wrench's lodging. These shaking strengths result in vibrations which obstruct the operation of the motor.

The slider-wrench instrument is much of the time used in undergrad designing courses to explore machine

#### SLIDER CRANK

#### MECHANISM CHECK VALVE



Check valves are mechanical valves that permit gases and liquids to flow in only one direction, preventing

kinematics and coming about element strengths. The position, speed, increasing speed and shaking powers produced by a slider-wrench system amid operation can be resolved scientifically. Certain elements are regularly disregarded from expository figurings, making comes about vary from exploratory information. The presumption is as often as possible made that the crankshaft's rakish speed is steady. In all actuality, precise speed is somewhat higher on the power stroke than the arrival stroke. The investigation of these slight fluctuations produces valuable understanding into the attributes of cylinder driven motors.

### CONCLUSION

It can be operated easily and high discharge from the pump by using only man power. In future we add spring arrangement in that project ,we will get high output comparatively present one. It is mainly operated without electrical energy.

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3. IRC (1988). *Hand pumps: issues and concepts in rural water supply programmes* (Technical paper series; no. 25). The Hague, The Netherlands, IRC International Water and Sa nitation Centre.

process flow from reversing. They are classified as one-way directional valves. Fluid flow in the desired direction opens the valve, while backflow forces the valve closed.



#### CHECK VALVE LUNGER

A plunger pump is a type of positive displacement pump where the high-pressure seal is stationary and a smooth cylindrical plunger slides through the seal. This makes them different from piston pumps and allows them to be used at higher pressures. This type of pump is often used to transfer municipal and industrial sewage.

## MERITS OF THE PUMP

- Efficiency is high.
- Input power is less.
- Efficient and easy to operate
- Less in input get more output

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