

# Speed Breaker Electricity Generation Mechanism

Mr. Lamkane Dhanaji Maruti , Lokhande Dipak Mahadev, Kshirsagar Tejraj Yuvraj, Awatade  
Onkar Bhaskar, Hake Somnath Laxman

## Chapter 1

### “Introduction”

#### 1.1 INTRODUCTION

Energy is the primary and most universal measure of all kinds of works by human beings and nature. Everything what happens in the world is the expression of flow of energy in one of its forms. Most people use the word energy for input to their bodies or to the machines and thus think about crude fuels and electric power.

Energy in the form of electricity plays a very important role in the life of a normal man. Electricity is one of the greatest wonders of science. Next to man, it is the most important and revolutionary creation in this world of ours .It has practically revolutionized the world .The gradual but excessive use of electricity has come to bring about a stupendous changes in industry. With it our modern gigantic tools are worked. Computers as also calculators sum up totals and make other calculations with the utmost accuracy. Newspapers and books are printed in millions overnight. There is not a single phase of human life that is not indebted to electricity for its progress .The modern age has, therefore, been truly called the “age of electricity.”

We do many things with electricity nowadays. We warm our homes, we drive the machines in factories, and we run our trains and buses. Electricity has completely revolutionized the methods of travel and transport .It has enabled us to travel in aero planes and fly into cold atmosphere of the sky. We also have electric trains in our country.

So today our whole life style is dependent on electricity with the increasing population the use of electric power is also increasing. But we know that the resources to generate electricity are limited, and this has lead to the energy crisis. During this scenario we need to generate electricity from things used in day-to-day life. In this project we have tried to generate electricity through speed breaker present on roads. As we know that vehicles on road are increasing day by day this will help us to generate electricity as these vehicles pass through the speed breaker. This electricity generated can be used for different purpose such as lighting of signals and streetlights on road etc. This set up requires very basic mechanical components such as gear shaft bearing. There are also some electrical components such battery, inverter etc.

#### 1.2 OBJECTIVE OF PROJECT

- The objective of our project is to produce electricity by very low price.
- In our country there is too much short fall of electricity and we try to overcome this problem by non conventional source of electricity.

## Chapter 2

### “LITERARURE SURVEY”

#### 2.1 Different types of device

##### 2.1.1 Connection through chain drive mechanism

##### 2.1.2 Through rack and pinion system

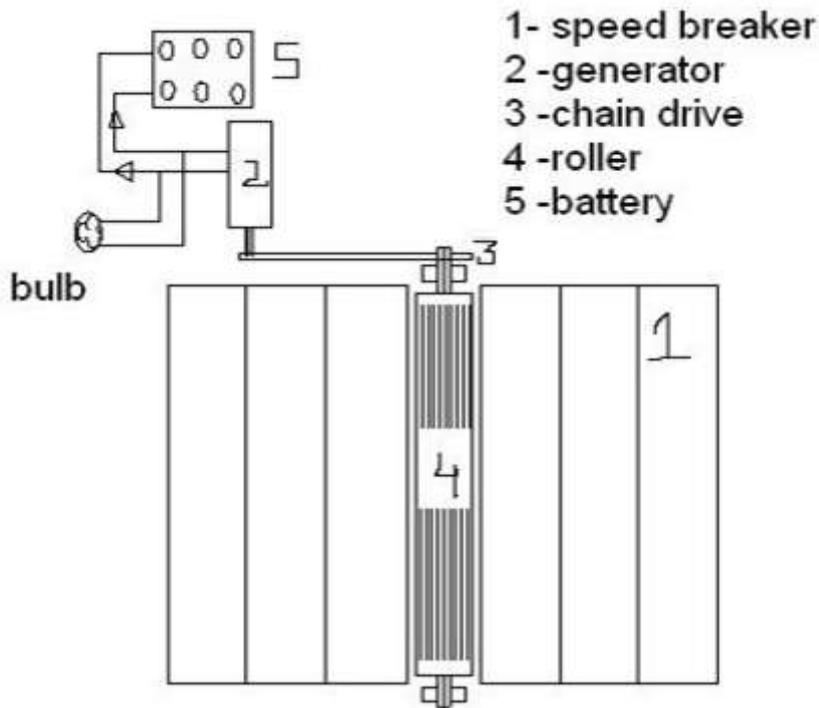
##### 2.1.3 Direct use of load

##### 2.1.4 Use of translator and stator topology

##### 2.1.5 Use of pressure through lever mechanism

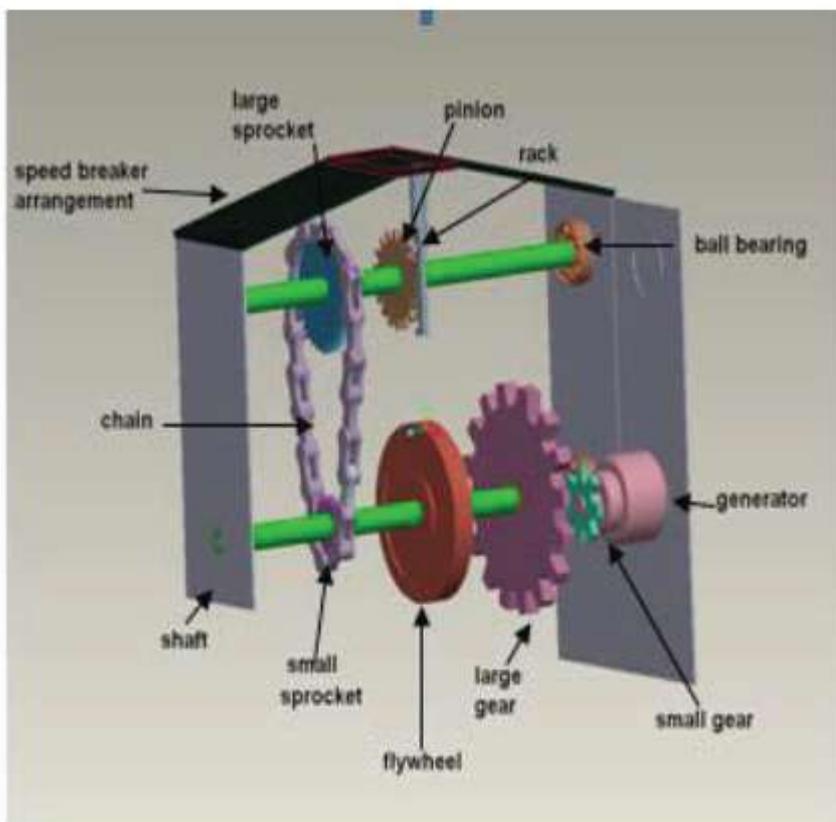
##### 2.1.1. Connection through chain drive mechanism

When the vehicle will come on the foot step because of its weight the top portion of the foot step moves down wards and the shaft consisting of the U portion rotated in a particular direction. Due to this rotation of the shaft, the sprocket will rotate and the rotational energy from one shaft is transferred to the other shaft with the help of chain drive mechanism. This rotates the gear on the bottom shaft, which in turn will help to rotate the gear placed on motor. This rotation of the gear starts the generator and generates electricity which can be stored in the battery and can be converted in A.C. current using inverter and can be used for lighting of the lamps signals sign boards on the road etc.



### 2.1.2. Through rack and pinion system

The project is concerned with generation of electricity from speed breaker-like set up. The load will acted upon the foot step & further the load will transmitted to rack and pinion arrangements. Here the reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement. The axis of the pinion is coupled with the sprocket arrangement. The sprocket arrangement is made of two sprockets. One of larger size and the other of smaller size. Both the sprockets are connected by means of a chain which serves in transmitting power from the larger sprocket to the smaller sprocket. As the power is transmitted from the larger sprocket to the smaller sprocket, the speed that is available at the larger sprocket is relatively multiplied at the rotation of the smaller sprocket.



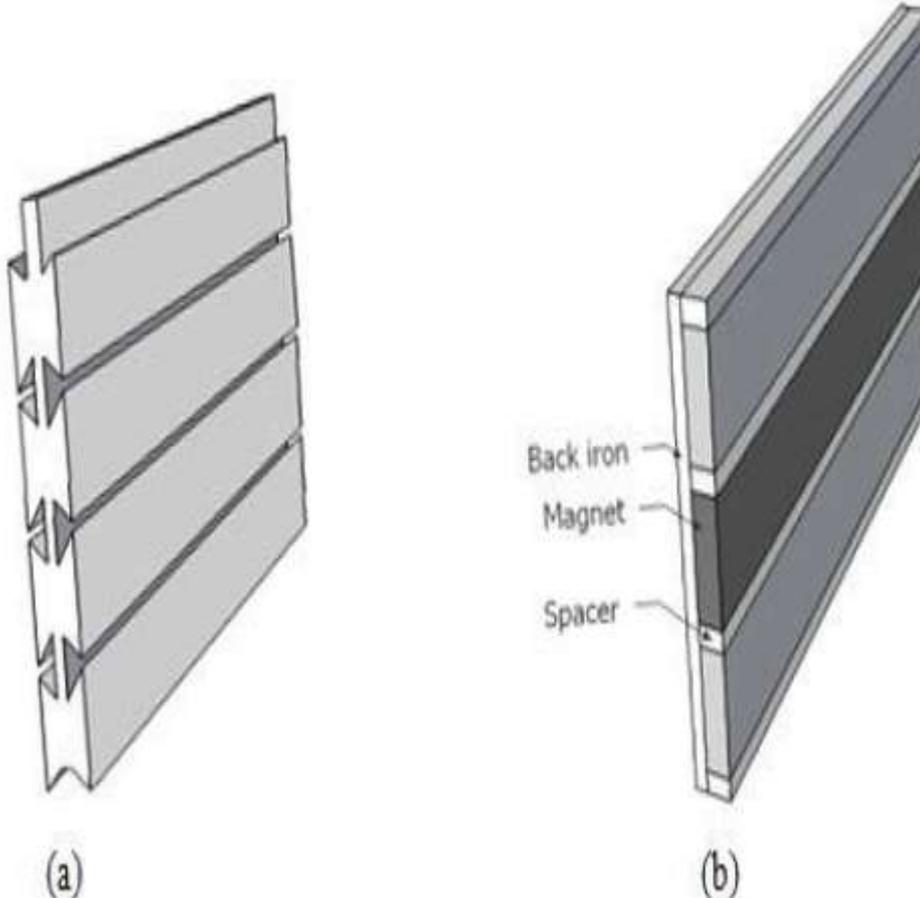
### 4.3. Direct use of load

The load can be directly used by using reciprocating device .It may be done with the help of shafts and spring as horizontal rod connected with shaft at its centre and springs at its both ends. this mechanism will give it a reciprocating motion and hence power can be generated .This motion is used to compress the air using compressing device and after compression, the air get collected in a cylinder and further can be used.



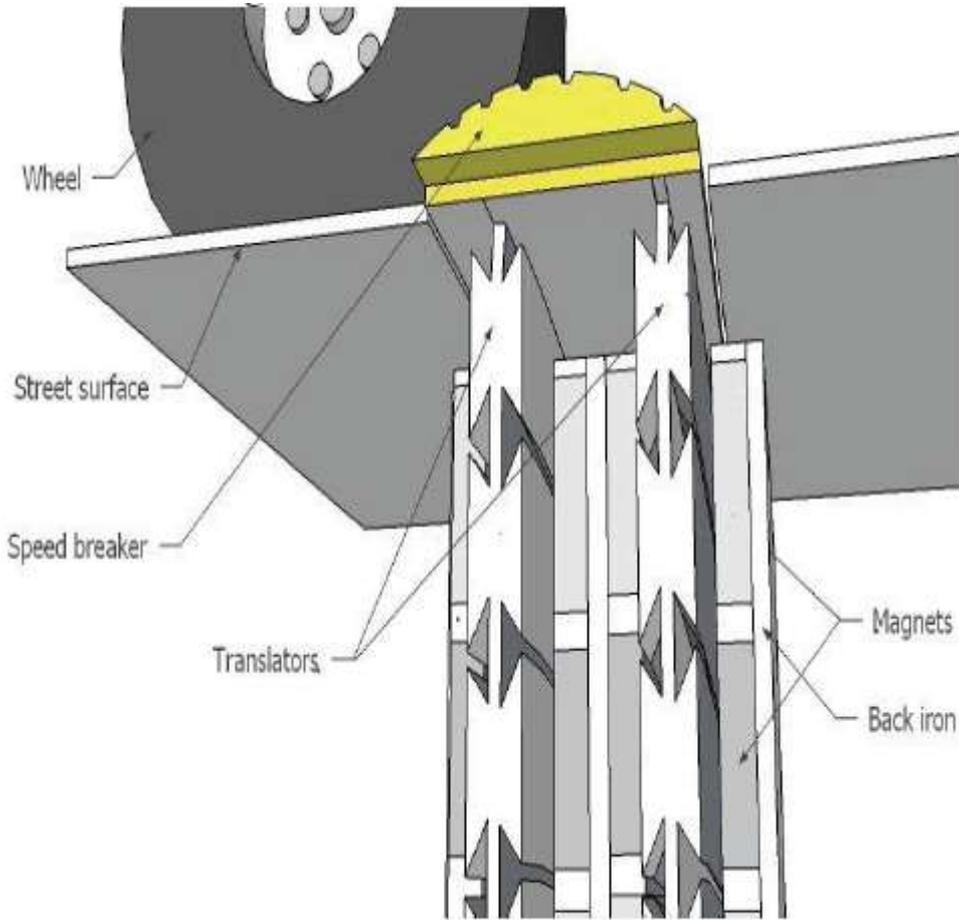
### 4.4. Use of translator and stator topology

(a) **Translators.** Each translator is a double slotted planar plate. The translator is wound as three phase connection winding. The generated power in the translators is delivered to output terminals of generator using flexible wires.



(b) **Stator.** The stator is a planar back iron with mounted magnets on it. The arrangement of magnets is N-S-N There is a spacer with high permeability between each two adjacent magnets.

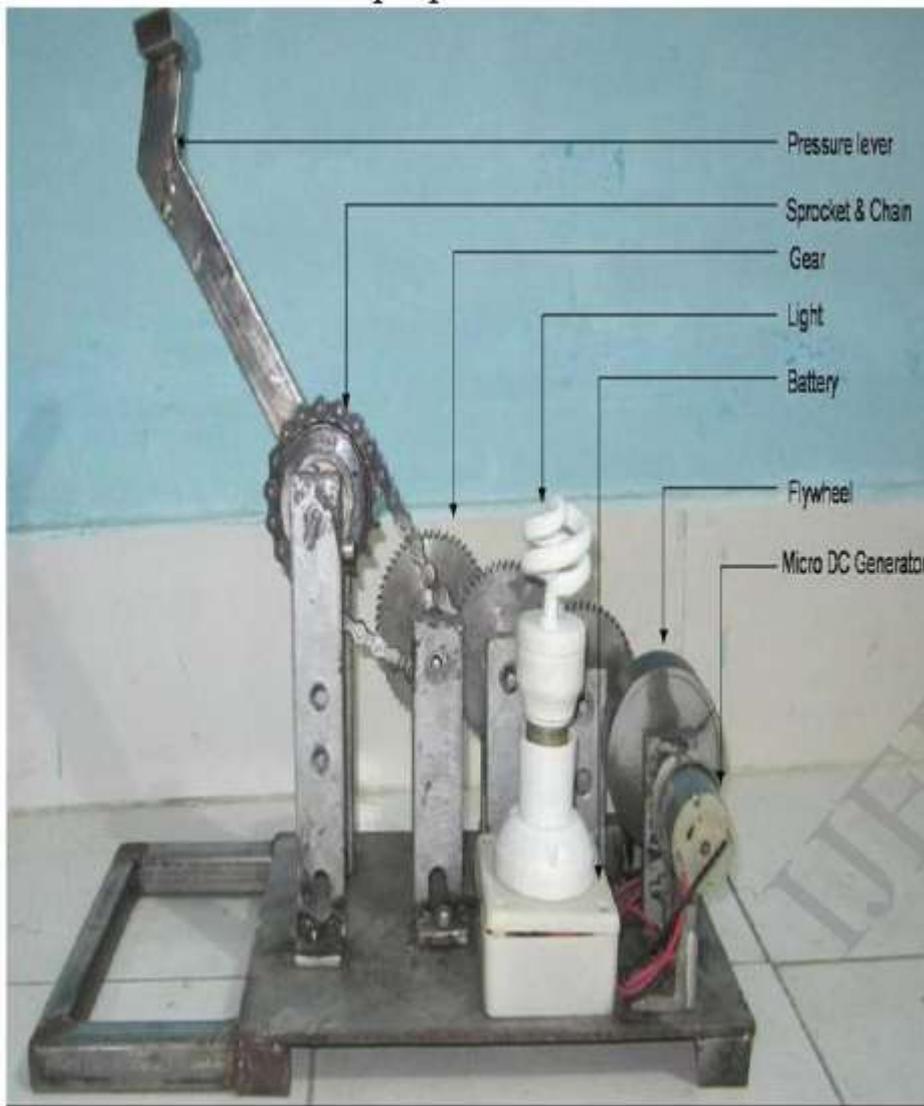
The operation principle of the SBG (foot step generators) can be described as follow. As the vehicle wheels pass the SBG, the translators will be pushed down. Since the magnets have provided a high density magnetic field in the air-gaps, motion of translators cause to induction of voltage in translator's windings. The produced power will be transferred via the flexible wires to output terminal of generators. It should be noted that, the flexible wires can be interpreted as brush and slips ring in electrical rotating machines.



#### 4.5 Use of pressure through lever mechanism

When pressure lever is pressed the flywheel will rotate by chine sprocket gear mechanism, it will force to rotate the DC generator because DC generator and flywheel are in same shaft. DC generator will produce electricity by the rotation of armature coil and generated electricity will be stored in a rechargeable battery. A rechargeable battery, storage battery, or accumulator can be used as storage device .This electricity can be used later for different–different purpose.

It can be seen in different design that the storagedevices are used according to convenience of situation, as it simply depends upon the need that which form of energy is require may be need of electricity either in form of direct current or in the form of alternating current. The power also may store in the form of compressed air as mentioned above in 2.1.3.



### Chapter 3

#### “KEY WORDS, NEED & AIM”

Non-conventional sources, Kinetic energy, Electro-mechanical unit, Foot step, magnetic field.

#### 3.1 INTRODUCTION:

In the present scenario power becomes the major need for human life. The availability and its per capita consumption is regarded as the index of national standard of living in the present day civilization. Energy is an important input in all the sectors of any country's economy. Energy crisis is due to two reasons, firstly the population of the world has been increased rapidly and secondly standard of living of human beings has increased. India is the country, which majorly suffers with lack of sufficient power generation. The per capita energy consumption of U.S.A. is about 8000 K.W.H., whereas per INDIA is only 150 K.W.H. U.S.A. with 7% of world population consumes 32% of total power generation whereas INDIA as a developing country with 20% of world population consumes only 1% of total energy consumed in the world. The availability of regular conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to investigate some approximate, alternative, new sources for the power generation, which is not depleted by the very few years. Another major problem, which is becoming the exiting topic for today is the pollution. It suffers all the living organisms of all kinds as on the land, in aqua and in air. Power stations and automobiles are the major pollution producing places. Therefore, we have to investigate other types of renewable sources, which produce electricity without using any commercial fossil fuels, which is not producing any harmful products. There are already existing such systems using renewable energy such as solar

wind), OTEC (ocean thermal energy conversions) etc...for power generation. The latest technology which is used to generate the power by such renewable energy is the POWER HUM

### 3.2 NEED FOR THE SYSTEM:

Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock. This whole human/bioenergy being wasted if can be made possible for utilization it will be great invention and crowd energy farms will be very useful energy sources in crowded countries. Walking across a "Crowd Farm," floor, then, will be a fun for idle people who can improve their health by exercising in such farms with earning. The electrical energy generated at such farms will be useful for nearby applications.

### 3.3 AIMS:

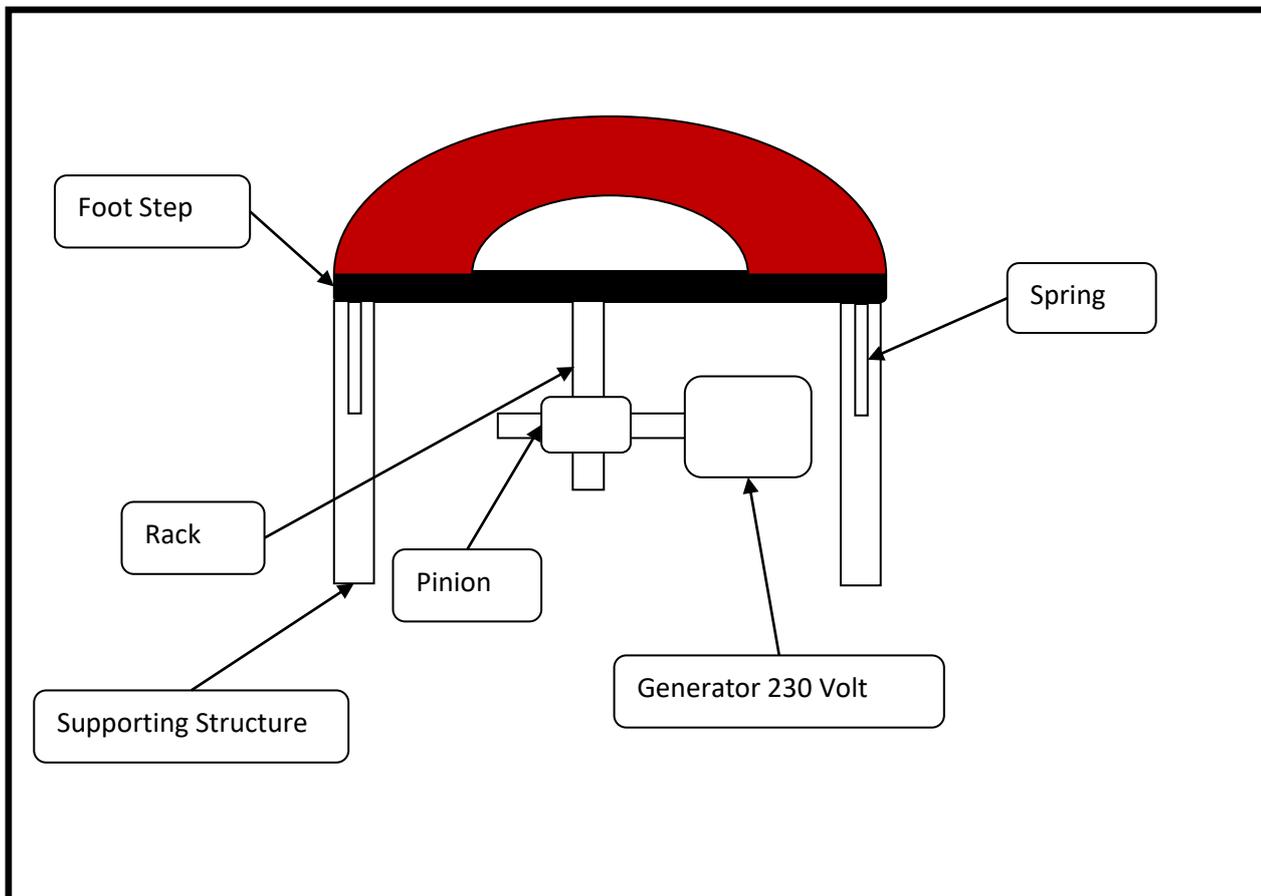
The main purpose of our project is 1. The "Crowd would work something like this A responsive sub-flooring system would be placed under, say, the platform of a subway terminal. The blocks that make up the system would depress slightly under the force of Human footsteps.

As the blocks slipped against each other, they would generate power in the form of an electric current. The electric current could be used, among other things, to light up signs about the energy created by the pedestrians, the creators say. People should understand the direct relationship between their movement and the energy produced," said co-creator Thaddeus Jusczyk. While the Crowd Farm wouldn't work in the home (a single human step generates only enough power to light two 60-watt light bulbs for one second), it could really draw some power from a crowd producing thousands of steps

## Chapter 4

### “DESIGN AND DEVELOPMENT”

#### 4.1 CONSTRUCTION AND WORKING



#### 4.2 WORKING PRINCIPLE:

While moving, the vehicles possess some kinetic energy and it is being wasted. This kinetic energy can be utilized to produce power by using a special arrangement called POWER HUMP. It is an Electro-Mechanical unit. It utilizes both mechanical technologies and electrical techniques for the power generation and its storage. POWERHUMP is a dome like device likely to be speed braker.

Whenever the man is allowed to pass over the dome it gets pressed down wards then the springs are attached to the dome are compressed and the rack which is attached to the bottom of the dome moves downward in reciprocating motion. Since the rack has teeth connected to gears, there exists conversion of reciprocating motion of rack into rotary motion of gears but the two gears rotate in opposite direction. A flywheel is mounted on the shaft whose function is to regulate the fluctuation in the energy and to make the energy uniform. So that the shafts will rotate with certain R.P.M. these shafts are connected through a belt drive to the dynamos, which converts the mechanical energy into electrical energy. The conversion will be proportional traffic density.

Whenever an armature rotates between the magnetic fields of south and north poles, an E.M.F (electro motive force) is induced in it. So, for inducing the E.M. Farnature coil has to rotate, for rotating this armature it is connected to a long shaft. By rotating same e.m.f, is induced, for this rotation kinetic energy of moving vehicles is utilized. The power is generated in both the directions; to convert this power into one-way special component is used called zenor diode for continuous supply. All this mechanism can be housed under the dome, like speed breaker, which is called HUMP. The electrical output can be improved by arranging these POWER HUMPS in series. This generated power can be amplified and stored by using different electrical devices.

#### 4.2 CONSTRUCTION DETAILS:

The various machine elements used in the construction of power hump are

- ❖ DOME
- ❖ RACK
- ❖ SPUR GEAR
- ❖ BEARINGS
- ❖ SHAFT
- ❖ SPRING
- ❖ BELT
- ❖ DYNAMO

##### 4.2.1. DOME

A dome is mounted on four springs and in the bottom, a rack is clamped. The rack consists contact teeth on both the faces. It is connected to two gear wheels to rotate the gear wheels only in one direction. We have inserted a free wheel in each gear. The free wheel and the gear assembly are mounted centrally. The flywheel is also mounted on the same shaft and the shaft is simply supported at the both ends by means of ball bearings. Now a dynamo is connected to each shaft by belt drive. The output terminal of dynamo is connected to an electrical storing device. The total assembly is arranged in concrete pit.

##### 4.2.2 RACK:

Its primary function is to convert translatory motion into rotary motion. It must have higher strength, rigidity and resistance to shock load and less wear and tear .Fig: Line diagram of power hump

##### 4.2.3 SPUR GEAR:

It is a positive power transmission device with definite velocity ratio. In voluteeth profile is preferred for adjusting some linear misalignment. It should have high wear and tear, shock-absorbing capacity

##### 4.2.4 FLY WHEEL:

The primary function of flywheel is to act as an energy accumulator. It reduces the fluctuations in speed. It absorbs the energy when demand is less and release the same when it is required.

##### 4.2.5 SHAFTS:

It is a rotating element, which is used to transmit power from one place to another place. It supports the rotating elements like gears and flywheels. It must have high torsional rigidity and lateral rigidity.

##### 4.2.6 SPRINGS:

It is defined as an elastic body whose function is to distort when loaded and to recover its original shape when the load is removed. It cushions, absorbs or control energy either due to shocks or due to vibrations.

#### 4.2.7 BEARINGS:

It is a machine element, which supports another machinery. It permits relative motion between the contacting surfaces while carrying the loads. They reduce the friction and transmit the motion effectively.

#### 4.2.8 ELECTRIC DYNAMO:

It is a device, which converts mechanical energy into electrical energy. It works based on “faraday’s laws of electromagnetic induction”.

### 4.3 LAWS:

#### 4.3.1 FIRST LAW:

Whenever a conductor cuts across magnetic lines of flux an e.m.f is induced in it.

#### 4.3.2 SECOND LAW:

The magnitude of induced e.m.f is equals to the rate of change of flux.

### 4.4 DESIGN OF ELEMENT

While designing is elements in the model or project configuration selection, selecting materials, shapes and dimensions is a task. In the design a particular mechanism is selected for the requirement. In design standards are also used in which various characteristics of the elements should confirm. The characteristics include materials, dimensions and quality of the items, some standards generally used are

1. Standard for material, then chemical composition, mechanical properties and heat treatment.
2. Shapes and dimensions are commonly used machine elements such as bolts, screws and nuts, rivets, belts and chains, ball and roller bearing, wire ropes keys and spines, modules for gears.
3. Standards for fits, tolerances and surface finish of components.
4. Standards for testing of products such as pressure vessels, boilers, traveling cranes, wire ropes where safety to operator is involved.
5. Standards for engineering drawing of components.

#### 4.4.1 ABOUT SIZE

The size of the element is a general term, which includes different parameters like power transmission capacity, speed, dimensions of the components such as height, length and width as well as volume and weight.

#### 4.4.2 SELECTION OF MATERIAL

Selection of a proper material for the machine component is one of the most important steps in the process of design. The best material is one which serves the described objective at minimum cost. It is not always easy to select such a material and the process may be involving the trial and error method. The following factors should be considered while selecting the material:

#### 4.4.3 AVAILABILITY

The material should be readily available In the market, in large enough quantities to meet the requirement.

#### 4.4.4 COST

For every application, there is limiting cost beyond which the designer can not go. When the limit is exceeded, the designer has to consider the other alternative material. In cost analysis, there are two factors, namely cost of material and the cost of processing the material in to finished goods.

#### 4.4.5 MECHANICAL PROPERTIES OF MATERIAL

The important mechanical properties of materials from the considerations of design are strength, rigidity, toughness, resilience, shock resistance, wear resistance, creep characteristics, corrosion resistance, frictional resistance and hardness. These properties are measured in terms of following quantities:

Strength (Static load)	- Ultimate tensile strength
Or tensile yield strength	
Strength (Fluctuating load)	-Endurance strength
Rigidity	- Modulus of elasticity
Ductility	- Percentage of elongation
Hardness	- Brielle or Rockwell hardness number
Toughness	- Charpy or Izode impact value
Frictional Properties	- Coe. Of friction

These properties govern the selection of materials. Depending upon the service conditions and the frictional requirements, different mechanical properties are considered and a suitable material is selected.

**4.5 MANUFACTURING CONSIDERATION**

Machinability of material is an important consideration in selection. When the elements or product has complex shape, casting properties are important. The manufacturing processes such as casting, rolling, forging, welding and machining governs the selection of material. The material selected for different elements are

1. Cast iron
2. Alloy steel
3. Plain carbon steel

**4.6 DESIGN OF BELT**

Selection an open belt drive using V- belt;

Reduction ratio = 1440 = 2.88

Planning an 1 stage reduction;

STAGE

A) Motor pulley ( D1) 2”

B) Main shaft pulley ( D2) =7”

**A) INPUT DATA**

INPUT POWER = 0.18 KW

INPUT SPEED = 1440 RPM

CENTERDISTANCE = 300MM

MAX BELT SPEED = 1600 M/MIN =26.67M/ SEC

GROOVE ANGLE ( 2 ) =40°

COEFFICIENT OF FRICTION =0.25

BETWEEN BELT AND PULLEY

ALLOWABLE TENSILE STRESSES = 2.5N/ mm<sup>2</sup>

**B) SECTION OF BELT SECTION**

Ref PSG DESIGN DATA (PG NO. 7.58)

C/S SYMBOL	UEUAL LAND OF DRIVE (KW)	NOMINAL TOP WIDTH (Wmm)	NOMINAL THICKNESS T mm	WEIGHT DER METER Kgf
A	0.75-5	13	8	0.106

$Sin = 0.2M \quad R2 -R 1 \quad D 1 -D 1$

$$= \frac{0.102 \times 2x}{150 - 50} - \frac{100}{2 \times 300}$$

→ = 9.590

Angle of lap smaller pulley; i.e; motor puller

$$\theta = 180 - 2 \times 9.59$$

$$\theta = 160.82$$

→  $\theta = 2.80c$

Now;

Mass of belt / meter length = 0.106kgf

→Centrifugal Tension ( Tc) Mv<sup>2</sup>

T c = 0.106 (26.67)<sup>2</sup>

Tc = 75.397N

Max Tension in belt (T) =f all x Area

= 2.5x 104 = 260N/mm<sup>2</sup>

\A) Tension in Tight side of belt =  $T_1 = T - T_c$   
 $= 260 - 75.397$

$T_1 = 184 \text{ N}$

B) Tension in slack side of belt = T

$2.3 \log \frac{T_1}{T_2}$

$\frac{T_1}{T_2} = 0 \times \cos \theta$

$T_2$

$= 0.25 \times 2.8 \times \operatorname{cosec} 20$

$\log \frac{T_1}{T_2}$

$\frac{T_1}{T_2} = 0.86$

$T_2$

$\rightarrow T_1 = 184 \text{ N}$

$T_2$

$T_2$

$\rightarrow T_2 = 25.28 \text{ N}$

POWER TRANSMITTING CAPACITY OF BELT ;

$P = (T_1 - T_2) v$

$= (184 - 25.28) 26.67$

$P = 4.23 \text{ kW}$

$\rightarrow$  Belt can safely transmit 4.23 kW power

C) LENGTH OF BELT

$L = \pi (R_2 - R_1) + 2(X) + \frac{(T_2 - T_1)^2}{4(X)}$

$L = 922.49 \text{ mm}$

$\rightarrow L = 35''$

SELECTION OF BELT.

Selection of belt 'A-35' from std manufacturers catalogue

MAKE : PIX

#### 4.7 RESULT TABLE

1	BELT SELECTED	A-36
2	Tight side Tension	$T_1 = 184 \text{ N}$
3	Slack side Tension	$T_2 = 25.28 \text{ N}$
4	Motor pulley dia (D1)	$D_1 = 50 \text{ MM}$
5	Pulley(a) diameter (D2)	$D_2 = 150 \text{ MM}$

#### 4.8 DESIGN OF SHAFT

Material selection for shaft

Shaft is subjected to fluctuating loads and some abrasion, wear during working hence, material selected is C30 steel having maximum tensile strength  $540 \text{ N/mm}^2$ .<sup>[13]</sup>

Taking factor of safety = 3

Allowable stress =  $540/3 = 180 \text{ N/mm}^2$

Allowable shear stress =  $180/2 = 90 \text{ N/mm}^2$

Power transmitted by shaft = 50.24 watt

Minimum diameter of shaft is 16 mm.

Checking the shaft for shear stress

$\tau = 16T/\pi d^3$

where  $\tau$  = shear stress developed in a shaft  $\text{N/mm}^2$

T = torque transmitted by shaft N-mm

d = diameter of shaft in mm

$\tau = (16 \times 16000)/(\pi \times 16^3)$

$\tau = 19.90 \text{ N/mm}^2$

But, allowable shear stress for shaft material is  $= 90 \text{ N/mm}^2$ .

Hence, design is safe.

#### 4.9 DESIGN OF SPRING

Lets max. force= $P=777.297\text{N}$

Shear stress=  $.5 * Sut$ ..... $Sut = \text{ultimate tensile strength} = 1190 \text{ N/MM}^2$   
 $= 595 \text{ N/MM}^2$

$K = (4C-1)/4C-4 + 0.615/C$

$= 1.2525$ ..... $C=6$

Shear stress= $K(8PC/3.14*d^2)$

$d=5\text{mm}$

$D=Cd$ ..... $D = \text{mean coil dia.}$

$= 30\text{mm}$

Deflection= $8PD^3N/Gd^4$ ..... $N = \text{no. of coils, } G = \text{modulus of rigidity}$

$N=15.14=15$

Assumed no. of inactive coils is 2

$N_t=15+2=17$

Pitch of coil= free length/ $N_t-1$ ..... free length= 300mm

$= 18.75\text{mm}$

#### 4.10 DESIGN OF GEAR

Material selected for gear is Grey C.I. GCI 20 having following properties strength  $220 \text{ N/mm}^2$

Brinell hardness number = 200 HN

Type of feeths involute ( spur gear)

Pressure angle = 20

Minimum number of teeth to avoid interference= $Z_{min}=2/\sin^2 \alpha$

$Z_{min}= 2/\sin^2(20)$

$Z_{min}=17.10$

Effective load on gear teeth

$P_t = 2 \cdot T/d$

Maximum effective load

$(P_t)_{max} = C_s \cdot P_t$

Where  $C_s$ - is centre factor  $C_s$  is taken equal to 1.25 from book Design of machine elements by Bhandari.

$T = 4.8358 \text{ N.m}$

$P_t = 2T/d$

$P_t = 2 \times 4.8358 \sqrt{(70 \times 10^{1/3})}$  (d=PCD)

$P_t = 138 \text{ N}$

$(P_t)_{max} = C_s \cdot P_t$

$(P_t)_{max} = 1.25 \times 138$

$(P_t)_{max} = 172.5 \text{ N}$

#### Beam strength of tooth

$S_b = m \cdot b \cdot \sigma_b Y$

Where,  $m = \text{Module,}$

$B = \text{Breath of height,}$

$\sigma_b = \text{Bending strength ( Permissible bending stress } \text{N/mm}^2)$

$Y = \text{Levis form factor}$

Module selected  $m = 1.5 \text{ mm,}$

& breath  $b = 20 \text{ mm,}$

$Y = 1.25 \text{ mm.}$

Allowable stress =  $\sigma_b = 200 \sqrt{2}$

$\sigma_b = 100 \text{ N/mm}$

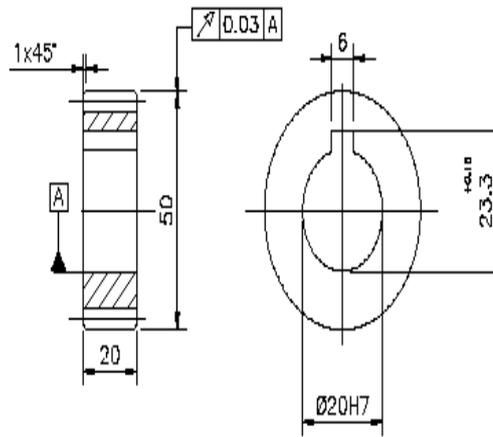
Hence,  $S_b = m \cdot b \cdot \sigma_b \cdot Y$

$S_b = 1.5 \times 15 \times 100 \times 1.25$

$$S_b = 2821.5N$$

$S_b > (P_t)_{max}$ , Hence, design is safe for bending

Sr.No.	Type of gear		Spur
1	Surface finish		
2	Class of accuracy		7GD
3	Module	Normal	$m_n$ 1.50D
4		Axial	$m_a$ -
5		Transverse	$m_t$ -
6	No. of teeth	Z	32
7	Pressure angle	$\alpha_{no}$	20°
8	Profile displacement factor	X	-
9	Shifting of base profile	$x_{mn}$	-
10	Helix angle at P.C.D.	$\beta$	-
11	Hand of helix		-
12	Lead angle	$\gamma$	-
13	Lead	H	-
14	Pitch circle dia.	$d_o$	47.00



## Chapter 5

### “PERFORMANCE ANALYSIS”

#### 4.1 PROCESS SHEET

5.1.1 Name of part: - **PINION**

Qty -01 Material: - En8

5.1.2 Name of part: - **SHAFT**

Qty -02

SR.NO	MACHINE	OPRATION	TIME[min]
1	Lathe machine	Facing a blank	5
2	Lathe machine	Turning	10
3	Lathe machine	Drilling	10
4	Lathe machine	Boring	10
5	Lathe machine	Chamfering	5
6	Milling m/c	Gear milling	30

Material:-c<sub>30</sub> steel

SR.NO	MACHINE	OPRATION	TIME[ <i>min</i> ]
1	Hack saw	Cutting from raw stock	05
2	Lathe machine	Facing	05
3	Lathe machine	Straight turning	20
4	Lathe machine	Countersunk drilling	05
5	Lathe machine	Threading	60
6	Lathe machine	Chamfering	05

5.1.3 Name of part: - **SUPPORT FRAME**

Qty -01

Material: - M.S. flat 60 ×25×200

SR.NO.	MACHINE	OPRATION	TIME[ <i>min</i> ]
1	Hack saw	Cutting a piece from raw stock	10
2	Milling machine	Squaring edges of piece	40
3	Lathe machine	Drilling	30
4	Lathe machine	Boring	60
5	Lathe machine	Facing	05
6	Lathe machine	Chamfering	05

5.1.4 Name of part: - **BLOCK**

Qty -04

Material: - Mild steel block ø 40×70x100

SR.NO	OPRATION	TIME[ <i>min</i> ]
1	Cutting from raw stock	05
2	Facing	05
3	Drilling	10
4	Boring	20
5	Internal threading	40
6	Straight turning	20
7	Grooving	05
8	Chamfering	05

5.1.5 Name of part: - **GEAR**

Qty -01

Material: - En8

SR.NO	MACHINE	OPRATION	TIME[ <i>min</i> ]
1	Lathe machine	Facing a blank	5
2	Lathe machine	Turning	10
3	Lathe machine	Drilling	10
4	Lathe machine	Boring	10
5	Lathe machine	Chamfering	5
6	Milling m/c	Gear milling	90

5.1.6 Name of part: - RACK

Qty -01

Material: - En8

SR.NO	MACHINE	OPRATION	TIME[min]
1	Lathe machine	Facing a blank	5
2	Lathe machine	Turning	10
3	Lathe machine	Drilling	10
4	Lathe machine	Boring	10
5	Lathe machine	Chamfering	5
6	Milling m/c	Gear milling	90

## Chapter 6

### “PHOTOGRAPHS & COST ANALYSIS”

#### 6.1 PHOTOGRAPHS



A. Main Project



C. Chain Sprocket Wheel



B. Rack & Pinion Mechanism



D. Dynamo

#### 6.2 LIST OF PARTS

Sr. No.	Part name	Qty (In No.)
1	M S angle	1
2	Shaft	2
3	M S pipe (square)	2
4	M S flat	1

5	Spring	2
6	Bolt	4
7	Washer	4
8	Frame	1 set
9	M.S plate	1
10	Grease	1 set
11	Welding rod	1 set
12	Rack	1 set
13	Pinion	2 set

### 6.3 COST ANALYSIS

The cost expenditure in current during the project work is divided into two major groups i.e. manufacturing cost and other cost. Other costs include cost of brought out parts, traveling and miscellaneous expenditure.

The manufacturing cost is calculated as summation of raw material cost and cost of processing.

Manufacturing cost = raw material cost + processing cost

Raw material cost = cost of raw material in Rs/kg × material in kg

Processing cost = processing or machining cost of each machine in minute.

### Chapter 7

#### “ADVANTAGES”

##### ADVANTAGES:

- ✓ Require simple construction methods.
- ✓ Free from all types of pollutions.
- ✓ It is economical and easy to install.
- ✓ Maintenance cost is low.
- ✓ This concept is quite promising due to its good efficiency as well as energy recovery criteria.
- ✓ No fuel transportation problem.
- ✓ No consumption of fossil fuel which is nonrenewable.
- ✓ No manual work necessary during generation.
- ✓ Energy available all year round.
- ✓ We can use it at all places according to desired design.

### Chapter 8

#### “DISADVANTAGES “

##### DISADVANTAGES:

- ✓ It gives low electric output
- ✓ It is not continues generating power
- ✓ Maintain cost is high
- ✓ More wear & tear

##### APPLICATION:

- ✓ Charging batteries and using them to light up the streets, etc
- ✓ Used In mall, where large amount people are run away

## Chapter 8

### “CONCLUSIONS”

This mechanism is the third mechanism . it is the crank shaft mechanism. whenever the vehicle going on the foot step ,the foot step goes downwards .so, the potential energy is converted into kinetic energy. here, we are used crank shaft mechanism for the development of the small amount of electricity. the electricity saves on the battery storage unit .the crank shaft mechanism is regained its previous position vice versa..

As day by day power consumption increases but electric crisis occur. So the minor needs of electricity such as street lights and traffic signals can be generated from speed breaker. Instead of wasting kinetic energy of vehicles at speed breaker the minor needs can be met but converting kinetic energy to electrical energy

## Chapter 9

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