



POWER GENERATION USING RAILWAY TRACK

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ABSTRACT

now a day demand of electrical energy is increases we need to generate the electrical energy from different sources. So In this project we are generate electricity simply by using railway track, we are using the simple mechanism of rack pinion and pulley arrangement and generated power by using running rail on track.

Keywords—*applied force,electrical power,pully arrenghmen,t railway tack.*

LINTRODUCTION

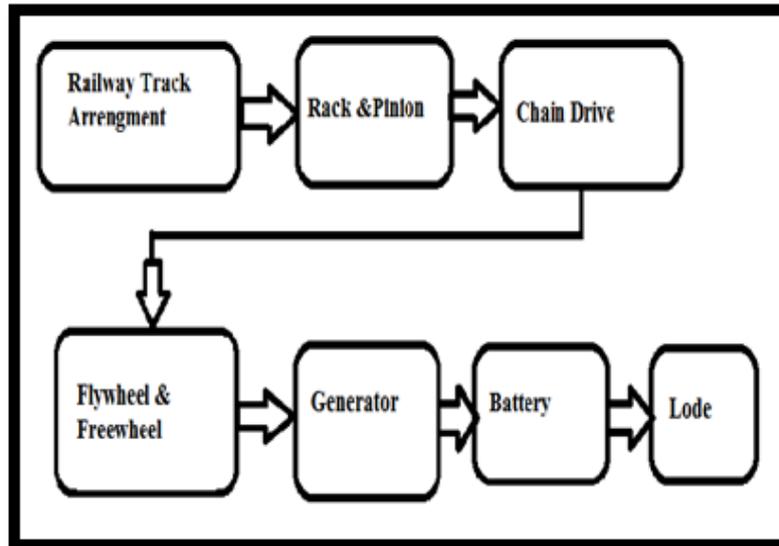
In day to day life demand of electrical energy is increses,so it's need to generated power at different way .we are electrical engineer discovered the new idea of power generation. As energy can niether be created or nor be destroyed from one form to another form, Power generation using the various non-conventional sources like wind,solar,etc. In india 5.86%only non-convetinal sources are used ,so in this project we also generated electrical power using the one of the non-convetinal energy source.in the india 40% of citizen are pfreded the railway for travelling purpose,so we using waste energy which is generated by railway and generated the electrical energy.basically in this project we are generated the electrical power from the force produed by railway track.

When a train moves over the track, the flap deflects in downward direction due to the load exerted by the train's bogies. The flap is moving in a downward direction the spring which is attached to flap get compress in downward direction and hence rack is also move in downward direction and due to these pinion get rotates and therefore bigger freewheel rotated because both are mounted on same shaft. As there is a rotation of bigger freewheel then the smaller freewheel is also rotated through chain drive. The freewheel and flywheel are mounted on same shaft therefore the flywheel also rotated. The flywheel is attached to the shaft of the generator so if the flywheel will rotated then there is a rotation shaft generator and power get generated and that power is stored into the battery.

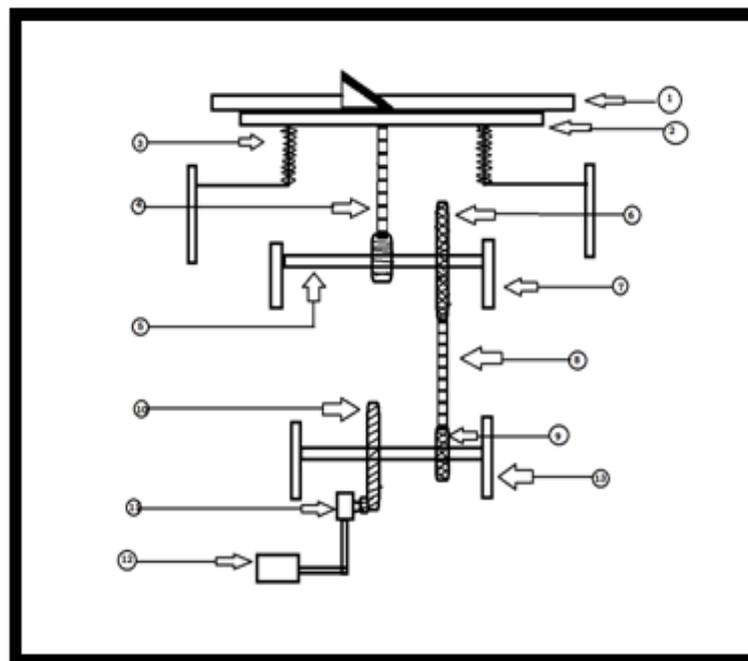
Railway bogies have the heavy load so large amount of force is produced. In railway have the number of bogies so each bogies produced the large force so this forces energy used for the generating electrical power. It is observed that the electrical power is in great demand. We can use this system to supply electricity for railway stations equipment like light, fan, signal light etc. we are modified this project and used as the foot step in the school, collage, commercial area which has the large public.



II. BLOCK DIAGRAM



III. CIRCUIT DIAGRAM





- | | |
|-------------------|---------------------|
| (1) Railway track | (8) Chain drive |
| (2) Flap | (9) Small freewheel |
| (3) Return spring | (10) Flywheel |
| (4) Rack | (11) Generator |
| (5) Shaft | (12) Battery |
| (6) Big freewheel | (14) Pinion |
| (7 & 13) support | |

III.COMPONENT DISCRIPTION

1) RAILWAY TRACK ARRANGEMENT

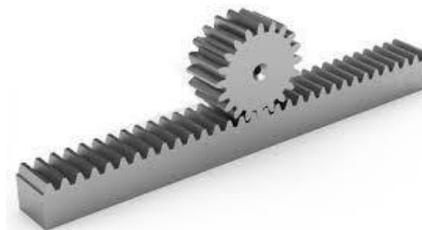
A railroad is a track where the vehicle travels over two parallel steel bars, called as rails. Railway is passed on the track and the large force is produced due to the heavy load of railway.



2) RACK AND PINION

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert linear motion into rotational motion. A circular gear called the pinion engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion

Rack & pinion used rotational motion to affect the linear motion via a rack & pinion combination. Rack consists the number of teeth and the pinion is the small wheel which is create the upward and downward motion. They are used frequently in long travel applications that require high stiffness & accuracy.



3) 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. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission 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 into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of Ithaca, New York, United States. This has inverted teeth. The power is transmitted by roller chain, known as the chain drive.



4) FLYWHEEL

A flywheel is a rotating mechanical device that is used to store rotational energy and also maintain the constant speed. Flywheels have moment of inertia and thus resist changes in rotational speed. The amount of energy stored in a flywheel is proportional to the square of its rotational speed.

Flywheels are typically made of steel and rotate on conventional bearings; these are generally limited to a maximum revolution rate of a few thousand RPM. High energy density flywheels can be made of carbon fiber composites and employ magnetic bearings, enabling them to revolve at speeds up to 60,000 RPM.



5) FREEWHEEL

In mechanical or automobile engineering freewheel or overrunning clutch is a device in a transmission that disengages the driveshaft from the driveshaft rotate from the driven shaft rotate faster than the driveshaft.

The simplest freewheel device consists of two saw-toothed, spring-loaded discs pressing against each other with the toothed sides together, somewhat like a ratchet. Rotating in one direction, the saw teeth of the drive disc lock with the teeth of the driven disc, making it rotate at the same speed.





6) DC GENERATOR

An electrical generator is a device that converts mechanical energy to electrical energy, generally using electromagnetic induction. The source of mechanical energy may be a reciprocating or turbine steam engine, water falling through turbine energy.



7) BATTERY

To charge a battery from AC we need a step down transformer, rectifier, filtering circuit, regulator to maintain the constant voltage then we can give that voltage to the battery to charge it. Think if you have only DC voltage and charge the lead acid battery, we can do it by giving that DC voltage to a DC-DC voltage regulator and some extra circuitry before giving to the lead acid battery.



IV. WORKING PROCEDURE

When the railway passing on the track then large force is produced, so we used this force energy for generated electrical energy. Flap is connected to the track .The rack & pinion spring arrangement is used at the railway track which is mounded bellow the frame. The spring is used to return the frame in same position by releasing the load. The pinion shaft is connected to the supporter by end bearings. The larger sprocket also coupled with the pinion shaft so that it is running the same speed of pinion. The larger sprocket is coupled to the small cycle sprocket with the help of chain drive. This larger sprocket is used to transfer the rotation force to the smaller sprocket. Direction of rotational movement of the larger sprocket.

The smaller sprocket is running same direction for the forward and reverses this action locks like a cycle pedaling action. The fly wheel and gear wheel is also coupled to the smaller sprocket shaft. The flywheel is used to increase the rpm of the smaller sprocket shaft. The gear wheel is coupled to the generator shaft with the help of another gear wheel. The generator is used here is permanent magnet generator. The generated voltage.



This voltage is stored to the lead-acid battery. This electrical energy is used to activate the light fan and etc.

V.SPECIFICATION OF COMPONENT

| SR.NO. | COMPONENT | SPECIFICATION |
|--------|---------------------------|--|
| 1 | Railway track arrangement | 1. Length of the base 600mm 2. Width of the base 300mm 3. Height of the base 500mm |
| 2 | Rack & pinion | 1. Length of rack – 200mm 2. Number of teeth -40 3. Diameter of pinion -30 mm 4. Number of teeth -18 |
| 3 | Flywheel | 1. Material – stainless steel 2. diameter – 150mm 3. Number of teeth – 36 |
| 4 | freewheel | 1) Material – stainless steel 2) Diameter – 80mm 3) Number of teeth – 18 4) Freewheeling – both direction |
| 5 | Chain drive | 1. Roller diameter – 7.95mm 2. Width – 7.85mm |
| 6 | Generator | 1. Bearing shaft diameter 80mm 2. Speed – 1000rpm 3. Output voltage – 20 volt |
| 7 | Battery | 1. Name- lead acid battery 2. Current-2.7amp 3. Voltage regulation-13.6v-13.8v |

VI.EXPERIMENTATION RESULT

The load is allowed to act as sudden load but not impact or gradual. A fixed load is released on the mechanism and the peak of the voltage reading shown on the multimeter is noted. The experiment is repeated at least five times and the average of the readings noted is considered to be the voltage generated by the device when corresponding load is applied. In our project the average voltage generated is 15 volt.



Table. Result obtained on the basis of flap deflection

| Sr.no | Deflection of flap(cm) | Voltage produced(volt) |
|-------|------------------------|------------------------|
| 1 | 3 | 5 |
| 2 | 5 | 10 |
| 3 | 7 | 15 |

From the table 1 and experimental procedure: - 1. With the increase in the load on the rack the output voltage increases.

2. The output varies with the position of the rack.

VII.FUTURE SCOPE

In this project we are also implemented the hybrid construction we connected to the turbine blade on the railway and generating the power.

This arrangement is also modified to construct in the speed breaker and this fixed in petrol pump, tollnaka,etc.

This arrangement is slightly modified to construct in foot step and this arrangement is fixed in-

- Schools.
- Cinema theatres.
- Shopping complex and many other buildings.

VIII.CONCLUSION

In this project electrical power was generated at railway track by using rack and pinion mechanism. This type of power generation is identified to be cheaper than many other alternatives and the model has less number of parts and the assembly would cost very less with all the components being available regularly and no model specific parts are to be manufactured.

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