

Air Production and Power Generation From Speed Braker in Road Ways

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Abstract: -- In our project we are producing the compressor air using with the aid of speed breaker setup in road ways. This is the simple and easy method of producing the compressor air with out using the electricity. Now days the electric power is demand is increased. So we are generating the compressed air without using the electric power. Here instead of electric drive we are using the mechanical drive to generate the compressed air. We are using the speed breaker to generate the compressor air. The main aim of this concept is to generate the electric power through the fabrication of air turbines with speed brake arrangement. Nowadays power demand is increased, so this project is used to generate the electrical power in order to compensate the electric power demand.

Keywords: Speed Breaker, Turbine etc.

I. INTRODUCTION

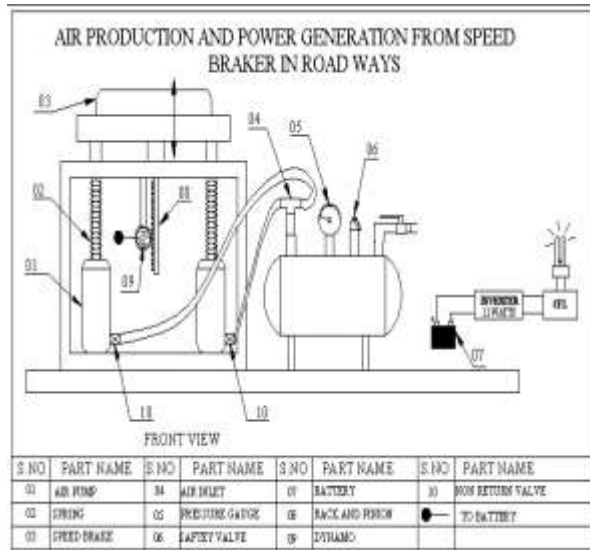
Perumbavoor is a traffic hectic town where two highways are intersecting. The AluvaMunnar (AM) road and Main Central (MC) road brings in large numbers of cars, trucks and bikes into the town. Even though these roads are very wide enough for multiple lanes of traffic, a free lane system without center lane, dividers, shoulders, stop signs, speed breakers and speed limit signs make the town very vulnerable to accidents and traffic blocks. Traffic deaths of pedestrians from accidents caused by unruly private bus drivers, risky motor bike driving and over speeding is a weekly story. Perumbavoor remains a hot spot for accidental deaths in State of Kerala which itself has the highest accident density for the entire nation. Long voicing by people, businesses and statesmen are showing signs of progress. For example the MC road is being demarked for lanes for independent counterflow traffic. However road AM is still a concern for public especially for safety of school children and minors. India has a huge network of over 3.314 million kilometers of roadways (2.1 million miles), making it one of the largest road networks in the world. This huge network, which includes both paved and unpaved roads, are categorized as expressways or freeways, National Highways, State Highways, major district roads, and rural & other roads. The roads generally are dual carriageways in expressways and highways. Road infrastructure is the main catalyst for the development of important key sectors of economy like Agriculture, Industry, Mining, Energy, Forestry and Dairy Development. These sectors depend heavily on the

development and maintenance of the road network and efficient transportation system.

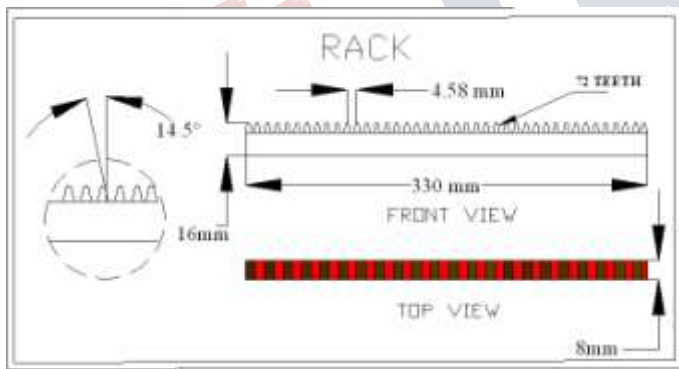
II. WORKING PRINCIPLE

The main components in this project are Air turbine, Dynamo (electrical generator), Air pumps, Rack and pinion, Return spring, Tank (air storage), and Battery. The air pump arrangements are fixed at the bottom of the speed brake arrangement with two return springs. The speed brake arrangement is mounted on the frame. If any vehicle crosses over the setup the air pump start to pump the air it moves upward and downward simultaneously. Due to this motion compressed air is produced. Then the compressed air is stored in the tank. Non return valves are used to direct the air to the tank and not return to the air pump. Then it is forced to the air turbine through the nozzle. The rack and pinion is coupled to speed brake. The speed brake is vehicle moving time is up and down movement for power saving purpose. The rack and pinion is linear motion convert to rotary motion, rack operating to pinion. The pinion shaft is coupled with the dynamo so that the dynamo generates the power supply. When the dynamo rotates the output DC voltage is stored in the battery. An inverter is connected to the battery to convert DC to AC. From the inverter a CFL is made to glow.

III. BLOCK DIAGRAM



IV. CALCULATION



Pressure angle of rack and pinion (p) = 20° full depth system
 Pitch of the rack and pinion (P) = 10 mm
 Addendum (a) = 1 / P
 Power of the motor (P1) = 250 w
 Speed of the motor (n) = 250 rpm

$$D_p = N_p / P_d$$

$$= 1 / 10 = 0.1 \text{ mm}$$

$$\text{Dedendum (D)} = 1.25 / P$$

$$= 1.25 / 10$$

$$= 0.125 \text{ mm}$$

$$\text{No of teeth on gear (N)} = \pi D / P$$

$$= \pi \times 90 / 10$$

$$= 28 \text{ teeth}$$

$$D_p = 28 / 10$$

$$= 2.8 \text{ mm}$$

$$\sigma = Ft / (ba \cdot m \cdot Y)$$

Y = lewis form factor = 0.352

Module of gear = m = 1 / D p

$$= 1 / 2.8$$

$$= 0.357$$

Face width of gear (ba) = 10 mm

Bending stress of gear = 110 Mpa

$$110 \times 10^3 = Ft / 10 \times 0.357 \times 0.352$$

$$Ft = 136 \times 10^3 \text{ N}$$

$$W = Ft \times v / 1000$$

Peripheral velocity of gear = v = π x D x N / 60 x 1000

$$= \pi \times 90 \times 250 / 60 \times 1000$$

$$= 1.178 \text{ m/s}$$

$$W = Ft \times v / 1000$$

$$= 136 \times 10^3 \times 1.178 / 1000$$

$$= 152 \text{ watts}$$

Pressure angle of gear = 25°

$$\text{Normal force (Fn)} = Ft \tan \theta$$

$$= 136 \times 10^3 \times \tan 25$$

$$= 16787 \text{ N}$$

$$\text{Radial load} = Fr = Ft / \tan\theta$$

$$= 136 \times 10^3 / \tan 25$$

$$= 340000 \text{ N}$$

$$Ft = \text{Transmitted force} = 2 T / Dp$$

$$= 2 \times$$

BATTERY CALCULATION:

$$\text{BAH / CI} = 8 \text{ ah} / 420 \text{ ma}$$

$$= 19 \text{ hrs}$$

To find the Current

$$\text{Watt} = 18 \text{ w}$$

$$\text{Volt} = 12 \text{ v}$$

$$\text{Current} = ?$$

$$P = V \times I$$

$$18 = 12 \times I$$

$$I = 18 / 12$$

$$= 1.5 \text{ AMPS}$$

BATTERY USAGE WITH 1.5 AMPS

$$\text{BAH / I}$$

$$8 / 1.5 = 5.3 \text{ hrs}$$

V. ADVANTAGES

- Compressed air is efficient to rotate the turbine
- Easy to operate
- Easy to maintain
- Power is stored to the battery

VI. DISADVANTAGES

- Cost of equipment is high
- Air is produced only at the time of vehicles crossing

VII. CONCLUSION

The project carried out by us made an impressive task in the field of working in the air. The making of compressor air in the simple way of using the speed breaker and power generation.

This project will reduce the cost involved in the concern. Project has been designed to perform the entire requirement task at the shortest time available.

VIII. ACKNOWLEDGEMENT

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