FABRICATION OF SPEED BREAKER POWER GENERATION SYSTEM

A PROJECT REPORT

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BONAFIDE CERTIFICATE

This is to be certificate that the project report titled **”DESIGN AND FABRICATION OF PNEUMATIC BEARING PRESS AND PULLER”** is the bonafide work of “M ELAVARASAN (952820114004),I KISHORE (952820114007),R ANITH (952820114309),U ABINASH (952820114302)’’ who carried out the project under my supervision.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

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.

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CHAPTER-1

ABSTRACT

In this project we are generating electrical power as non-conventional method by simply running on the vehicles in the speed breakers. Non-conventional energy system is very essential at this time to our nation. **Non-conventional energy using speed breakers** needs no fuel input power to generate the output of the electrical power. This project using simple drive mechanism such as rack and pinion assemble and chain drive mechanism.

For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack & pinion, D.C generator, battery and inverter control. We have discussed the various applications and further extension also. So this project is implemented to all speed breaker, the power generation is very high. The initial cost of this arrangement is high.

CHAPTER -2

INTRODUCTION

Next time on the roads, don’t scoff at the speed breakers. They could actually light up small villages off the highway. The rotor (rotating shaft) is directly connected to the prime mover and rotates as the prime mover turns. The rotor contains a magnet that, when turned, produces a moving or rotating magnetic field. The rotor is surrounded by a stationary casing called the stator, which contains the wound copper coils or windings. When the moving magnetic field passes by these windings, electricity is produced in them. By controlling the speed at which the rotor is turned, a steady flow of electricity is produced in the windings. These windings are connected to the electricity network via transmission lines. IIT Guwahati has evaluated the machine and recommended it to the Assam ministry of power for large scale funding. IIT design department says it is a ‘very viable proposition’ to harness thousands of megawatts of electricity untapped across the country every day. A vehicle weighing 1,000 kg going up a height of 10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute. The figure will be huge at the end of the day. A storage module like an inverter will have to be fitted to each such rumble strip to store this electricity. The cost of electricity generation andstorage per mega watt from speed-breakers will be nearly Rs 1 crore as opposed to about Rs 8 crore in thermal or hydro power stations.The electricity sector in India had an installed capacity of 185.5 Gigawatt (GW) as of November 2011, the world's fifth largest. Thermal power plants constitute 65% of the installed capacity, hydroelectric about 21% and rest being a combination of wind, small hydro, biomass, waste-to-electricity, and nuclear.

In terms of fuel, coal-fired plants account for 55% of India's installed electricity capacity, compared to South Africa's 92%; China's 77%; and Australia's 76%. After coal, renewal hydropower accounts for 21%, and natural gas for about 10%.

In December 2011, over 300 million Indian citizens had no access to electricity. Over one third of India's rural population lacked electricity, as did 6% of the urban population. Of those who did have access to electricity in India, the supply was intermittent and unreliable. In 2010, blackouts and power shedding interrupted irrigation and manufacturing across the country.

The per capita average annual domestic electricity consumption in India in 2009 was 96 kWh in rural areas and 288 kWh in urban areas for those with access to electricity, in contrast to the worldwide per capita annual average of 2600 kWh and 6200 kWh in the European Union. India's total domestic, agricultural and industrial per capita energy consumption estimates vary depending on the source. Two sources place it between 400 to 700 kWh in 2008–2009. As of January 2012, one report found the per capita total consumption in India to be 778 kWh.

India currently suffers from a major shortage of electricity generation capacity, even though it is the world's fourth largest energy consumer after United States, China and Russia. The International Energy Agency estimates India needs an investment of at least $135 billion to provide universal access of electricity to its population.

The International Energy Agency estimates India will add between 600 GW to 1200 GW of additional new power generation capacity before 2050.This added new capacity is equivalent to the 740 GW of total power generation capacity of European Union (EU-27) in 2005. The technologies and fuel sources India adopts, as it adds this electricity generation capacity, may make significant impact to global resource usage and environmental issues.

India's electricity sector is amongst the world's most active players in renewable energy utilization, especially wind energy. As of December 2011, India had an installed capacity of about 22.4 GW of renewal technologies-based electricity, exceeding the total installed electricity capacity in Austria by all technologies.

Electricity distribution network in India is inefficient compared to other networks in the world. India's network losses exceeded 32% in 2010, compared to world average of less than 15%. Loss reduction technologies, if adopted in India, can add about 30 GW of electrical power, while simultaneously reducing electricity cost and carbon footprint pollution per MWHr used.

Key implementation challenges for India's electricity sector include new project management and execution, ensuring availability of fuel quantities and qualities, lack of initiative to develop large coal and natural gas resources present in India, land acquisition, environmental clearances at state and central government level, and training of skilled manpower to prevent talent shortages for operating latest technology plants. In scientific period, all the equipment's rely on the electricity. Electricity serves as a back bone to this success. There are several methods for electricity generation. In this sector we got a new method for electricity generating through speed breakers which is eco-friendly.Coming to the design, the speed breakers which are fully developed and made with springs. This supply as a resource for the alternator.

1.1 DEMAND OF POWER

Of the 1.4 billion people of the world who have no access to electricity in the world, India accounts for over 300 million.

Some 800 million Indians use traditional fuels – fuelwood, agricultural waste and biomass cakes – for cooking and general heating needs. These traditional fuels are burnt in cook stoves, known as chulah or chulha in some parts of India. Traditional fuel is inefficient source of energy, its burning releases high levels of smoke, PM10 particulate matter, NOX, SOX, PAHs, polyaromatics, formaldehyde, carbon monoxide and other air pollutants. Some reports, including one by the World Health Organization, claim 300,000 to 400,000 people in India die of indoor air pollution and carbon monoxide poisoning every year because of biomass burning and use of chullahs. Traditional fuel burning in conventional cook stoves releases unnecessarily large amounts of pollutants, between 5 to 15 times higher than industrial combustion of coal, thereby affecting outdoor air quality, haze and smog, chronic health problems, damage to forests, ecosystems and global climate. Burning of biomass and firewood will not stop, these reports claim, unless electricity or clean burning fuel and combustion technologies become reliably available and widely adopted in rural and urban India. The growth of electricity sector in India may help find a sustainable alternative to traditional fuel burning.

In addition to air pollution problems, a 2007 study finds that discharge of untreated sewage is single most important cause for pollution of surface and ground water in India. There is a large gap between generation and treatment of domestic wastewater in India. The problem is not only that India lacks sufficient treatment capacity but also that the sewage treatment plants that exist do not operate and are not maintained. Majority of the government-owned sewage treatment plants remain closed most of the time in part because of the lack of reliable electricity supply to operate the plants. The wastewater generated in these areas normally percolates in the soil or evaporates. The uncollected wastes accumulate in the urban areas cause unhygienic conditions, release heavy metals and pollutants that leaches to surface and groundwater. Almost all rivers, lakes and water bodies are severely polluted in India. Water pollution also adversely impacts river, wetland and ocean life. Reliable generation and supply of electricity is essential for addressing India's water pollution and associated environmental issues.Other drivers for India's electricity sector are its rapidly growing economy, rising exports, improving infrastructure and increasing household incomes.

1.2 **Demand trends**

Electricity transmission grid in eastern India.

As in previous years, during the year 2010–11, demand for electricity in India far outstripped availability, both in terms of base load energy and peak availability. Base load requirement was 861,591 (MU) against availability of 788,355 MU, a 8.5% deficit. During peak loads, the demand was for 122 GW against availability of 110 GW, a 9.8% shortfall.

In a May 2011 report, India's Central Electricity Authority anticipated, for 2011–12 year, a base load energy deficit and peaking shortage to be 10.3% and 12.9% respectively. The peaking shortage would prevail in all regions of the country, varying from 5.9% in the North-Eastern region to 14.5% in the Southern Region. India also expects all regions to face energy shortage varying from 0.3% in the North-Eastern region to 11.0% in the Western region. India's Central Electricity Authority expects a surplus output in some of the states of Northern India, those with predominantly hydropower capacity, but only during the monsoon months. In these states, shortage conditions would prevail during winter season. According to this report, the five states with largest power demand and availability, as of May 2011, were Maharashtra, Andhra Pradesh, Tamil Nadu, Uttar Pradesh and Gujarat.

In late 2011 newspaper articles, Gujarat was declared a power surplus state, with about 2–3 GW more power available than its internal demand. The state was expecting more capacity to become available. It was expecting to find customers, sell excess capacity to meet power demand in other states of India, thereby generate revenues for the state.

Despite an ambitious rural electrification program,some 400 million Indians lose electricity access during blackouts. While 80% of Indian villages have at least an electricity line, just 52.5% of rural households have access to electricity. In urban areas, the access to electricity is 93.1% in 2008. The overall electrification rate in India is 64.5% while 35.5% of the population still live without access to electricity.

According to a sample of 97,882 households in 2002, electricity was the main source of lighting for 53% of rural households compared to 36% in 1993. The 17th electric power survey of India report claims:

Over 2010–11, India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, public lighting and other miscellaneous applications accounted for the rest.

The electrical energy demand for 2016–17 is expected to be at least 1392 Tera Watt Hours, with a peak electric demand of 218 GW.

The electrical energy demand for 2021–22 is expected to be at least 1915 Tera Watt Hours, with a peak electric demand of 298 GW.

If current average transmission and distribution average losses remain same (32%), India needs to add about 135 GW of power generation capacity, before 2017, to satisfy the projected demand after losses.

McKinsey claims that India's demand for electricity may cross 300 GW, earlier than most estimates. To explain their estimates, they point to four reasons:

India's manufacturing sector is likely to grow faster than in the past

Domestic demand will increase more rapidly as the quality of life for more Indians improve

About 125,000 villages are likely to get connected to India's electricity grid

Currently blackouts and load shedding artificially suppresses demand; this demand will be sought as revenue potential by power distribution companies

A demand of 300GW will require about 400 GW of installed capacity, McKinsey notes. The extra capacity is necessary to account for plant availability, infrastructure maintenance, spinning reserve and losses.

In 2010, electricity losses in India during transmission and distribution were about 24%, while losses because of consumer theft or billing deficiencies added another 10–15%.

CHAPTER 3

LITERARY SURVEY

1 THE BURGER KING ON U.S. HIGHWAY, CUSTOMERS PULLS IN AND OUT ALL DAY, AND AT LEAST 100,000 CARS VISIT THE DRIVE-THRU EACH YEAR. AND A NEWLY INSTALLED, MECHANIZED SPEED BUMP(VIDEO) WILL BOTH HELP THEM SLOW DOWN AND HARVEST SOME OF THAT COASTING ENERGY. The weight of a car is used to throw a lever, explains Gerard Lynch, the engineer behind the MotionPower system developed for New Energy Technologies, a Maryland-based company. "The instantaneous power is 2,000 watts at five miles-per-hour, but it's instantaneous which means some form of storage will be required.

2 JOURNAL OF ENGINEERING RESEARCHANDSTUDIES.PRODUCE ELECTRICITY BY THE USE OF SPEED BREAKERS. ASWATHAMAN.V, ELECTRONICS AND COMMUNICATION ENGINEERING SONA COLLEGE OF TECHNOLOGY, SALEM, INDIA This paper attempts to show how energy can be tapped and used at a commonly used system- the road speed breakers. The number of vehicles passing over the speed breaker in roads is

increasing day by day. A large amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction, every time a vehicle passes over it. There is great possibility of tapping this energy and generating power by making the speed-breaker as a power generation unit. The generated power can be used for the lamps, near the speed breakers. The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption in India is 1200 KWh (Kilo Watt hour). One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy. A recent survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most part of the country is poor. Hence more research and development and commercialization of technologies are needed in this field. India, unlike the top developed countries has very poor roads. Talking about a particular road itself includes a number of speed breakers. By just placing a unit like the “Power Generation Unit from Speed Breakers”, so much of energy can be tapped. This energy can be used for the lights on the either sides of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages.

3 JOURNAL OF ENGINEERING RESEARCH AND STUDIES.PRODUCE ELECTRICITY BY THE USE OF SPEED BREAKERS SHAKUN SRIVASTAVA, ANKIT ASTHANA, DEPARTMENT OF MECHANICAL ENGINEERING, KANPUR INSTITUTE OF TECHNOLOGY, KANPURThe rotor (rotating shaft) is directly connected to the prime mover and rotates as the prime mover turns. The rotor contains a magnet that, when turned, produces a moving or rotating magnetic field. The rotor is surrounded by a stationary casing called the stator, which contains the wound copper coils or windings. When the moving magnetic field passes by these windings, electricity is produced in them. By controlling the speed at which the rotor is turned, a steady flow of electricity is produced in the windings. These windings are connected to the electricity network via transmission lines. IIT Guwahati has evaluated the machine and recommended it to the Assam ministry of power for large scale funding. IIT design department says it is a „very viable proposition" to harness thousands of megawatts of electricity untapped across the country every day. A vehicle weighing 1,000 kg going up a height of 10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100vehicles pass every minute, about one kilo watt of electricity can be produced every single minute. The figure will be huge at the end of the day. A storage module like an inverter will have to be

fitted to each such rumble strip to store this electricity. The cost of electricity generation and storage per megawatt from speed-breakers will be nearly Rs 1 crore as opposed to about Rs 8 crores in thermal or hydro power stations.

CHAPTER 4

POWER GENERATION

Tehri Hydroelectric Power station's lake in Uttarakhand. Tehri is Asia's tallest, and world's 8th tallest dam. With a capacity of 2.4 GW, it is India's largest hydroelectric power generation installation. Power development in India was first started in 1897 in Darjeeling, followed by commissioning of a hydropower station at Sivasamudram in Karnataka during 1902.India's electricity generation capacity additions from 1950 to 1985 were very low when compared to developed nations. Since 1990, India has been one of the fastest growing markets for new electricity generation capacity. The country's annual electricity generation capacity has increased in last 20 years by about 120 GW, from about 66 GW in 1991 to over 100 GW in 2001, to over 185 GW in 2011. India's Power Finance Corporation Limited projects that current and approved electricity capacity addition projects in India are expected to add about 100 GW of installed capacity between 2012 and 2017. This growth makes India one the fastest growing markets for electricity infrastructure equipment. India's installed capacity growth rates are still less than those achieved by China, and short of capacity needed to ensure universal availability of electricity throughout India by 2017. State-owned and privately owned companies are significant players in India's electricity sector, with the private sector growing at a faster rate. India's central government and state governments jointly regulate electricity sector in India.

As of August 2011, the states and union territories of India with power surplus were Himachal Pradesh, Sikkim, Tripura, Gujarat, Delhi and Dadra and Nagar Haveli.Major economic and social drivers for India's push for electricity generation include India's goal to provide universal access, the need to replace current highly polluting energy sources in use in India with cleaner energy sources, a rapidly growing economy, increasing household incomes, limited domestic reserves of fossil fuels and the adverse impact on the environment of rapid development in urban and regional areas. The table below presents the electricity generation capacity, as well as availability to India's end user and their demand. The difference between installed capacity and availability is the transmission, distribution and consumer losses. The gap between availability and demand is the shortage India is suffering. This shortage in supply ignores the effects of waiting list of users in rural, urban and industrial customers; it also ignores the demand gap from India's unreliable electricity supply. According to India's Ministry of Power, about 14.1 GW of new thermal power plants under construction are expected to be put in use by December 2012, so are 2.1 GW capacity hydropower plants and a 1 GW capacity nuclear power plant. India's installed generation capacity should top 200 GW in 2012. In 2010, the five largest power companies in India, by installed capacity, in decreasing order, were the state-owned NTPC, state-owned NHPC, followed by three privately owned companies: Tata Power, Reliance Power and Adani Power. In India's effort to add electricity generation capacity over 2009–2011, both central government and state government owned power companies have repeatedly failed to add the capacity targets because of issues with procurement of equipment and poor project management. Private companies have delivered better results.

3.1 POWER GENERATION FROM OTHER SOURCES

Thermal power plants convert energy rich fuel into electricity and heat. Possible fuels include coal, natural gas, petroleum products, agricultural waste and domestic trash / waste. Other sources of fuel include landfill gas and biogases. In some plants, renewal fuels such as biogas are co-fired with coal.Coal and lignite accounted for about 57% of India's installed capacity. However, since wind energy depends on wind speed, and hydropower energy on water levels, thermal power plants account for over 65% of India's generated electricity. India's electricity sector consumes about 80% of the coal produced in the country. India expects that its projected rapid growth in electricity generation over the next couple of decades is expected to be largely met by thermal power plants.

3.1.1 Fuel constraints

A large part of Indian coal reserve is similar to Gondwana coal. It is of low calorific value and high ash content. The iron content is low in India's coal, and toxic trace element concentrations are negligible. The natural fuel value of Indian coal is poor. On average, the Indian power plants using India's coal supply consume about 0.7 kg of coal to generate a kWh, whereas United States thermal power plants consume about 0.45 kg of coal per kWh. The high ash content in India's coal affects the thermal power plant's potential emissions. Therefore, India's Ministry of Environment & Forests has mandated the use of beneficiated coals whose ash content has been reduced to 34% (or lower) in power plants in urban, ecologically sensitive and other critically polluted areas, and ecologically sensitive areas. Coal benefaction industry has rapidly grown in India, with current capacity topping 90 MT. Thermal power plants can deploy a wide range of technologies. Some of the major technologies include: Steam cycle facilities (most commonly used for large utilities); Gas turbines (commonly used for moderate sized peaking facilities); Cogeneration and combined cycle facility (the combination of gas turbines or internal combustion engines with heat recovery systems); and Internal combustion engines (commonly used for small remote sites or stand-by power generation). India has an extensive review process, one that includes environment impact assessment, prior to a thermal power plant being approved for construction and commissioning. The Ministry of Environment and Forests has published a technical guidance manual to help project proposers and to prevent environmental pollution in India from thermal power plants. It is the world's largest masonry dam, with an installed capacity of 800MW. The dam also irrigates about 1.4 million acres of previously drought-prone land.

In this system of power generation, the potential of the water falling under gravitational force is utilized to rotate a turbine which again is coupled to a Generator, leading to generation of electricity. India is one of the pioneering countries in establishing hydro-electric power plants. The power plants at Darjeeling and Shimsha (Shivanasamudra) were established in 1898 and 1902 respectively and are among the first in Asia. India is endowed with economically exploitable and viable hydro potential assessed to be about 84,000 MW at 60% load factor. In addition, 6,780 MW in terms of installed capacity from Small, Mini, and Micro Hydel schemes have been assessed. Also, 56 sites for pumped storage schemes with an aggregate installed capacity of 94,000 MW have been identified. It is the most widely used form of renewable energy. India is blessed with immense amount of hydro-electric potential and ranks 5th in terms of exploitable hydro-potential on global scenario.

3.1.2 Nuclear power

Kudankulam nuclear power plant under construction in 2009. It was 96% complete as of March 2011, with first phase expected to be in use in 2012. With initial installed capacity of 2 GW, this plant will be expanded to 6 GW capacity.

As of 2011, India had 4.8 GW of installed electricity generation capacity using nuclear fuels. It produced over 26000 million units of electricity. India's nuclear power plant development began in 1964. India signed an agreement with General Electric of the United States for the construction and commissioning of two boiling water reactors at Tarapur. In 1967, this effort was placed under India's Department of Atomic Energy. In 1971, India set up its first pressurised heavy water reactors with Canadian collaboration in Rajasthan. In 1987, India created Nuclear Power Corporation of India Limited to commercialize nuclear power. Nuclear Power Corporation of India Limited is a public sector enterprise, wholly owned by the Government of India, under the administrative control of its Department of Atomic Energy. Its objective is to implement and operate nuclear power stations for India's electricity sector. The state-owned company has ambitious plans to establish 63 GW generation capacity by 2032, as a safe, environmentally benign and economically viable source of electrical energy to meet the increasing electricity needs of India.

India's nuclear power generation effort satisfies many safeguards and oversights, such as getting ISO-14001 accreditation for environment management system and peer review by World Association of Nuclear Operators including a pre-start up peer review. Nuclear Power Corporation of India Limited admits, in its annual report for 2011, that its biggest challenge is to address the public and policy maker perceptions about the safety of nuclear power, particularly after the Fukushima incident in Japan.

3.1.3 **Other renewable energy**

As of December 2011, India had an installed capacity of about 22.4 GW of renewal technologies-based electricity, about 12% of its total.[52] For context, the total installed capacity for electricity in Switzerland was about 18 GW in 2009. The table below provides the capacity breakdown by various technologies. Renewal energy installed capacity in India (as of August 31, 2011) As of August 2011, India had deployed renewal energy to provide electricity in 8846 remote villages, installed 4.4 million family biogas plants, 1800 microhydel units and 4.7 million square meters of solar water heating capacity. India anticipates to add another 3.6 GW of renewal energy installed capacity by December 2012. India plans to add about 30 GW of installed electricity generation capacity based on renewal energy technologies, by 2017. Renewable energy projects in India are regulated and championed by the central government's Ministry of New and Renewable Energy.

3.1.4 Solar power

Solar resource map for India. The western states of the country are naturally gifted with high solar incidence.

India is bestowed with solar irradiation ranging from 4 to 7 kWh/square meter/day across the country, with western and southern regions having higher solar incidence India is endowed with rich solar energy resource. India receives the highest global solar radiation on a horizontal surface. With its growing electricity demand, India has initiated steps to develop its large potential for solar energy based power generation. In November 2009, the Government of India launched its Jawaharlal Nehru National Solar Mission under the National Action Plan on Climate Change. Under this central government initiative, India plans to generate 1 GW of power by 2013 and up to 20 GW grid-based solar power, 2 GW of off-grid solar power and cover 20 million square metres with solar energy collectors by 2020.[55] India plans utility scale solar power generation plants through solar parks with dedicated infrastructure by state governments, among others, the governments of Gujarat and Rajasthan.

3.1.5 **Biomass power**

In this system biomass, bagasse, forestry and agro residue & agricultural wastes are used as fuel to produce electricity.

Biomass gasifier

India has been promoting biomass gasifier technologies in its rural areas, to utilize surplus biomass resources such as rice husk, crop stalks, small wood chips, other agro-residues. The goal was to produce electricity for villages with power plants of up to 2 MW capacities. During 2011, India installed 25 rice husk based gasifier systems for distributed power generation in 70 remote villages of Bihar. In addition, gasifier systems are being installed at 60 rice mills in India. During the year, biomass gasifier projects of 1.20 MW in Gujarat and 0.5 MW in Tamil Nadu were successfully installed.

3.1.6 Biogas

This pilot program aims to install small scale biogas plants for meeting the cooking energy needs in rural areas of India. During 2011, some 45000 small scale biogas plants were installed. Cumulatively, India has installed 4.44 million small scale biogas plants.

In 2011, India started a new initiative with the aim to demonstrate medium size mixed feed biogas-fertilizer pilot plants. This technology aims for generation, purification/enrichment, bottling and piped distribution of biogas. India approved 21 of these projects with aggregate capacity of 37016 cubic meter per day, of which 2 projects have been successfully commissioned by December 2011.[52]

India has additionally commissioned 158 projects under its Biogas based Distributed/Grid Power Generation programme, with a total installed capacity of about 2 MW.

India is rich in biomass and has a potential of 16,881MW (agro-residues and plantations), 5000MW (bagasse cogeneration) and 2700MW (energy recovery from waste). Biomass power generation in India is an industry that attracts investments of over INR 600 crores every year, generating more than 5000 million units of electricity and yearly employment of more than 10 million man-days in the rural areas.

As of 2010, India burnt over 200 million tonnes of coal replacement worth of traditional biomass fuel every year to meet its energy need for cooking and other domestic use. This traditional biomass fuel – fuelwood, crop waste and animal dung – is a potential raw material for the application of biomass technologies for the recovery of cleaner fuel, fertilizers and electricity with significantly lower pollution.

Biomass available in India can and has been playing an important role as fuel for sugar mills, textiles, paper mills, and small and medium enterprises (SME). In particular there is a significant potential in breweries, textile mills, fertilizer plants, the paper and pulp industry, solvent extraction units, rice mills, petrochemical plants and other industries to harness biomass power.

3.1.7 Geothermal energy

India's geothermal energy installed capacity is experimental. Commercial use is insignificant.

India has potential resources to harvest geothermal energy. The resource map for India has been grouped into six geothermal provinces:

3.2 Problems with India's power sector

According to Oil and Gas Journal, India had approximately 38 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2011, world’s 26th largest. United States Energy Information Administration estimates that India produced approximately 1.8 Tcf of natural gas in 2010, while consuming roughly 2.3 Tcf of natural gas. The electrical power and fertilizer sectors account for nearly three-quarters of natural gas consumption in India. Natural gas is expected to be an increasingly important component of energy consumption as the country pursues energy resource diversification and overall energy security.

Until 2008, the majority of India's natural gas production came from the Mumbai High complex in the northwest part of the country. Recent discoveries in the Bay of Bengal have shifted the center of gravity of Indian natural gas production.

The country already produces some coalbed methane and has major potential to expand this source of cleaner fuel. According to a 2011 Oil and Gas Journal report, India is estimated to have between 600 to 2000 Tcf of shale gas resources (one of the world's largest). Despite its natural resource potential, and an opportunity to create energy industry jobs, India has yet to hold a licensing round for its shale gas blocks. It is not even mentioned in India's central government energy infrastructure or electricity generation plan documents through 2025. The traditional natural gas reserves too have been very slow to develop in India because regulatory burdens and bureaucratic red tape severely limit the country's ability to harness its natural gas resources.

3.3 SPEED BREAKERS

Speed breakers are used to slow down the speed of vehicle by offering a resistance on wheels. It is in strips in two to five number lying parallel to each other on the road. It can be easily seen on railway crossings.

We do have several speed breakers In roads, at present we contain speed breakers of rigid type, In which this is made of steel or with tar. For example while a heavy load crosses the speed breaker it ruins unchanged, finally by yourself the limits the speed of vehicles The national highways come with minimum 8 meters wide, 0.015m thickness. We are proposing minor changes in the current roads.

CHAPTER 5

COMPONENTS

4.1 Alternator

Generally an electrical generator is a machine which adapts mechanical energy in to electrical energy. The energy conversion is totally based on the principle of production of dynamically induced e.m.f. According to Faraday's laws of electromagnetic induction, at whatever time a conductor cuts magnetic flux, dynamically induced e.m.f, is produced in it. So this e.m.f source a current to flow if the conductor circuit is closed.

Two basic essential parts of an electric generator are

1.A magnetic field and

2.A conductor or conductors which can so as to move to cut the flux.

Alternator varies from d.c generator in the portion of stationary armature rise on a stationary element called stator and field windings on a rotating element called rotor. So slip rings, brushes and commutator are removed.

Generation of induced e.m.f, When the rotor rotates, the stator conductors are cut by the magnetic flux, hence they have induced e.m.f. produced in them.

4.2 Dynamo

The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faraday's law. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turn within that field. On small machines the constant magnetic field may be provided by one or more permanent magnets; larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils.

4.3 DESIGN OF SYSTEM

Now in these design we are manufacture the speed breaker of vibrating type, As soon as a vehicle moves and crosses the speed breaker, immediately they are in depressed state and finally come back to their back to its original position.

4.4 Dimensions

These are some of the dimensions for this model and for novel method

Height of speed breaker : 0.2m

Width of speed breaker : 0.4m

Length of speed breaker : 0.5m

For the complete manufacturing steel is used for speed breaker: Steel

4.5 Speed breaker -design

The fitting range of speed breakers are with helical spring at the base. It is trapezoidal shape, for the reason that as soon as a vehicle comes to point A, the load will be acting between A and B. Then it compresses the speed breaker, this will get down by the presence of spring. When a vehicle is in between B & C, there will be maximum load on the speed breaker. At the C & D, there will be minimum load on speed breaker.

The following are the dimensions for a hollow trench are

Height: 0.35m

Length: 4m

Width : 0.45m

A hollow trench, In these base is completely filled with concrete or with wooden plates of 0.5m. only for the cushion effect. Beyond this layer helical springs of n windings is wounded.

The speed breaker is supposed to be a uniformly distributed load. For design, the design weight can be create by the product of factor of safety and its whole weight. The factors of safety verify the maximum level that the beam (speed breaker) can be loaded.

4.6 Spring design

Before loading the definite height of spring is 0.3m. The deflection of the spring is given by

$\delta = 64\, w * n * N * R^3 / (Gd^4)$

Where

δ-deflection (in our case maximum δ =0.1m)

w=designed load

R= mean diameter of coil

d =diameter of wire

n=no of spring turns

G= Modulus of rigidity = 8*10^4 N/mm2

N= No. of springs

⇧⇧***Impact of vehicle on speed breaker***

The no of turns in the spring to get the deflection of 0.1m is given by

n= δGd^4/ (64 w*N*R^3)

When the vehicle crosses the speed breaker, the air inside which is at the base will be compressed.

⇧⇧***Speed and frequency***

In an alternator, there exists a definite relationship between the rotational speed (N) of the rotor, the frequency (f) of the generated e.m.f. and the number of poles (P).

Consider the armature conductor marked x situated at the centre of a N-pole rotating in clockwise direction. The conductor being, situated at the place of maximum flux density will have maximum e.m.f. induced in it.

The direction of the induced e.m.f. is given by Fleming's right hand rule. i.e the thumb indicates the direction of the motion of the conductor relative to the field.

When the conductor is in the interpolar gap as at gap A, it has minimum e.m.f. induced in it, because flux density is minimum. Again when it is at the centre of a S- pole, it has maximum e.m.f induced in it, because flux density at B is maximum. But the direction of e.m.f. when the conductor is over a N- pole is opposite to that when it is over a S- pole. Obviously one cycle of e.m.f. is induced in a conductor when one pair of poles passes over it. In other words, the e.m.f. in an armature conductor goes through one cycle in angular distance equal to twice the pole-pitch.

Let

P= total no of magnetic poles

N= rotative speed of the rotor in r.p.m

f= frequency of generated e.m.f. in hz

Since one cycle of e.m.f is produced when a pair of poles passes past a conductor the no of cycles of e.m.f produced in one revolution of the rotor is equal to the no of pair of poles.

No of cycles/revolution = P/2

and

No of revolutions/second = N/60Frequency = (P/2)*(N/60) = P*N/120 hz

Thus the mechanical energy from speed breaker serves as an input source to the alternator which generates the electricity of 10kw.

4.7 CALCULATIONS

A vehicle weighing 1,000 kg going up a height of 10 cm on a rumble strip produces approximately 0.98KW power. By placing one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every minute electricity generation from speed breaker

4.8 OUTPUTPOWER CALCULATIONS:

Let us consider,

The mass of a vehicle moving over the speed breaker

=250Kg (Approximately)

Height of speed brake =10 cm

Work done=Force x Distance

Here,

Force=Weight of the Body

=250 Kg x 9.81

=2452.5 N

Distance traveled by the body = Height of the speed brake

=10 m

Output power=Work done/Sec

= (2452.5 x 0.10)/60

=4.0875 Watts (For One pushing force)

Power developed for 1 vehicle passing over the speed

breaker arrangement for one minute= 4.0875 watts

Power developed for 60 minutes (1 hr) =245.25 watts

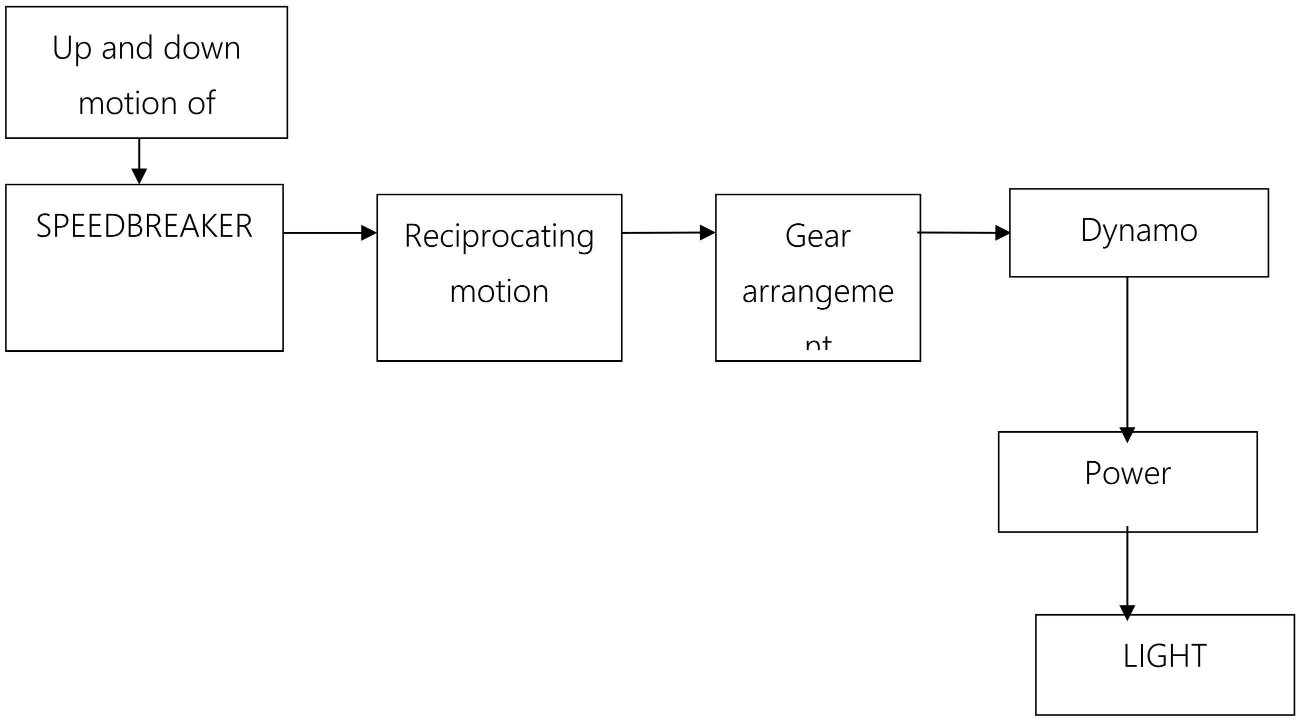
Power developed for 24 hours=5.866 Kw

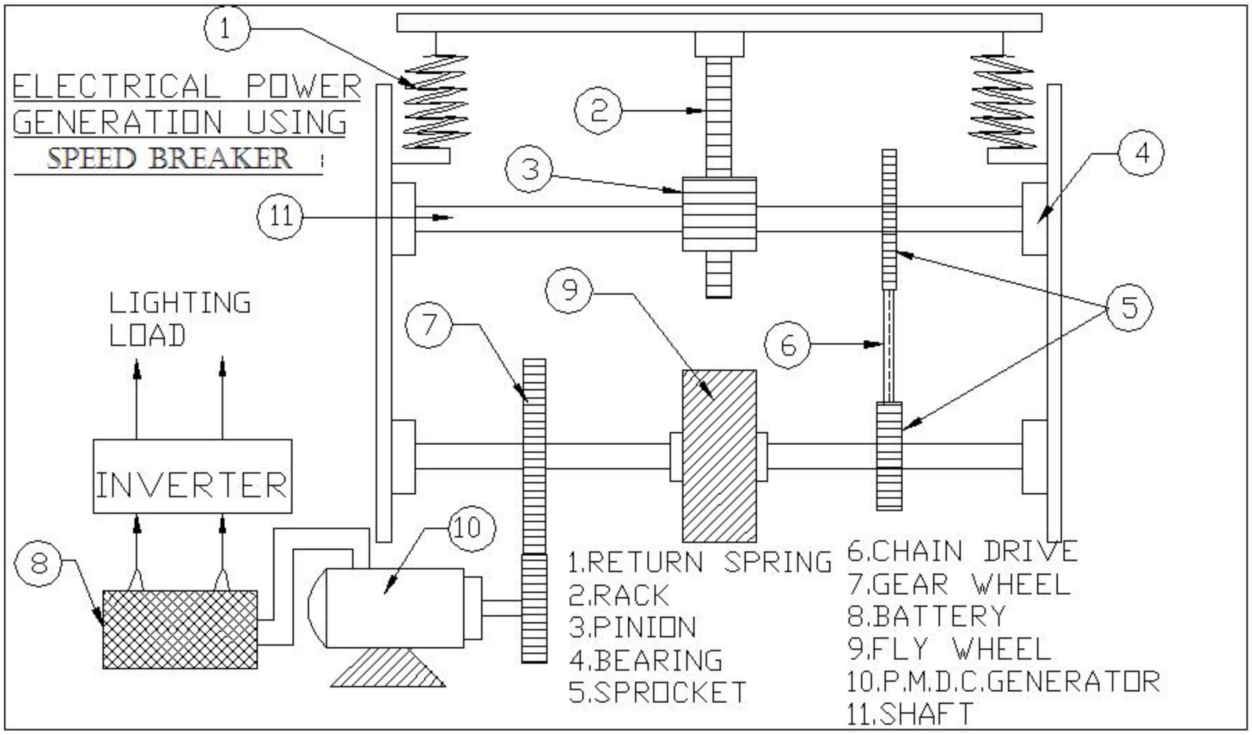
This power is sufficient to burn four street lights in the

roads in the night time.

CHAPTER -6

5.1 BLOCK DIAGRAM




ELECTRICAL POWER GENERATION USING SPEED BREAKER :
LIGHTING LOAD
INVERTER
1
2
3
4
5
6
7
8
9
10
11
1.RETURN SPRING
2.RACK
3.PINION
4.BEARING
5.SPROCKET
6.CHAIN DRIVE
7.GEAR WHEEL
8.BATTERY
9.FLY WHEEL
10.P.M.D.C.GENERATOR
11.SHAFT

5.2 PRINCIPLE OF OPERATION

This project explains the mechanism of electricity generation from speed breakers.The vehicle load acted upon the speed breaker system is transmitted to rack and pinion arrangements. Then, reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement where the axis of the pinion is coupled with the sprocket arrangement. The sprocket arrangement is made of two sprockets. One of the sprocket is larger in dimension than the other sprocket. Both the sprockets are connected with chain which transmits the 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. The axis of the smaller sprocket is coupled to a gear arrangement. Here we have two gears with different dimensions. The gear wheel with the larger diameter is coupled to the axis of the smaller sprocket. Hence, the speed that has been increased at the smaller sprocket wheel is passed on to this gear wheel of larger diameter. The smaller gear is coupled to the larger gear. Therefore, as the larger gear rotates it increases the speed of the smaller gear which is following the larger gear and multiplies the speed to more intensity. Though the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, the final speed achieved is high. This speed is sufficient to rotate the rotor of a generator and is fed into the rotor of a generator. The rotor which rotates within a static magnetic stator cuts the magnetic flux surrounding it, thus producing the electric motive force (emf). This regulated emf is now sent to the storage battery where it is stored during the day time and can be used in night time for providing power to street lights.

5.3 FUTURE SCOPE

Such speed breakers can be designed for heavy vehicles, thus increasing input torque and ultimately output of generator. More suitable and compact mechanisms to enhance efficiency.

5.5 ADVANTAGES

- Power generation is simply running the vehicle on this arrangement
- Power also generated by running or exercising on the brake.
- No need fuel input
- This is a Non-conventional system
- Battery is used to store the generated power

5.6 APPLICATIONS

Power generation using speed breaker system can be used in most of the places such as

- All highways road speed breaker
- Foot Step Arrangements
- Bridges

CHAPTER -7

CONCLUSION AND FUTURE ASPECTS

In the coming days, as demand of electricity is increasing every moment, it will prove a great boon to the world, since it will save a lot of electricity of power plants which are wasted in illuminating the street light. Future aim of this research is to develop our country by enriching it in utilizing its sources in more useful manner. Any country can only develop when it uses power supply frequently and not by getting breakdown in middle course of time. Now times comes when these types of innovative ideas should be brought into practice. Atleast, by this idea we should start to think something about to save electricity. This project can also be modified by using camshaft and pulley system instead of gears which we have used in our project which will reduce the complexities and difficulties faced during the project.

CHAPTER -8

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