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Investigating cutting edge methods for energy solutions

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Abstract*— In present research work, the engine investigated is more efficient and fuel less, making it an eco-friendly one. The automobile industry of today could be improved (in terms of sustainability and efficiency) by utilizing this engine. This engine's several parts combine to transform hydro-energy into mechanical energy. Even though this engine is still in the early stages of research, it has an immense potential to function effectively as a sustainable energy source. As the engine is not designed by the methods of combustion of fossil fuel, it does not emit harmful or toxic gases like CO2 or NOx. So, it is able to control the fuel related pollutants in our environment. Popularity of the engine is satisfactory.

Keywords*— Common release valve, Free moving bucket, Fuel less engine, non-combustion engine, Reverse pinion.

I. INTRODUCTION

An engine or motor is a machine designed to convert one or more forms of energy into mechanical energy. Internal combustion engines (ICE): An internal combustion engine is one that burns fuel inside the engine. And external combustion engines: Those engines in which the fuel combustion takes place outside the engine, such as in a steam engine. Society continues to rely heavily on IC engines for transportation, commerce, and power generation [1]. That is why engine research is so important. Due to the combustion of fuel, the engine uses accompanying emission of pollutants, including nitric oxides (NOx) [2] and particulates (soot), as well as the production of CO_2 [3] Pollutant emissions. And these are so harmful for both environment and human health [4]. An external combustion engine is a heat engine where an (internal) working fluid is compressed and heated by combustion of an external fuel through the engine wall or a heat exchanger [5]. Both the engine (IC engine and EC) needs fossil fuel to supply of heat from the sources like biomass and biomass-derived products, municipal waste, nuclear, solar, geothermal, or exothermic reactions. So, we need such type of engine which is not involving any kind of combustion because the burning of fossil fuel releases different types of toxic and harmful gases to the environment. And as we know, the sustainable energies are not permanent in our Earth. So, the fuel less engine is preferable to solve the problems related to environment and the saving of sustainable energy sources [8]. The engine avoids the whole methods related to combustion. So, we are able to control the fuel related pollutants and conserve the sustainable energy sources.

II. COMPONENTS AND MECHANISM OF THE ENGINE

Design approach: The design of the engine is completely new to the engines' world. This engine utilizes basically, two hydraulic jacks, a common release valve, two crankshafts, a rack, four pinions, a hydraulic oil tank, six piston assemblies, twelve release valves and a reverse pinion. These components are especially designed for the engine. Theory/working principle: Here, the concept of gravity has been employed. As we know, the amount of lifting force of hydraulic jack is exceedingly larger than the applying force. The working principle of the engine- 'Conserving the force due to weight, leaf spring and some amount of the kinetic energy of the vehicle to lifting force (lifting force of hydraulic jacks), converts it to kinetic energy'. And the factors (weight, leaf spring force and some amount of kinetic energy of the vehicle) cause high efficiency of the engine.

Originality/value: The efficiency of the engine is directly proportional to the force due to the weight, leaf spring and kinetic energy of the vehicle. The RPM of the engine is slower than the other engines. So, we have to adjust it by changing gear ratio.

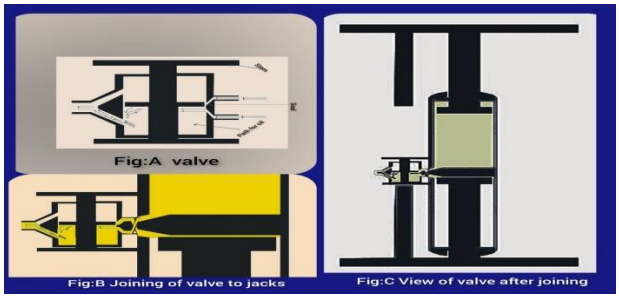

Figure 1: Schematic of valve

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This valve plays some special roles to the engine. Basically, it maintains and controls the potential difference of hydraulic oil between the two jacks. It utilizes two handles, two stems, two flow out paths, packing and packing nut. The hydraulic oil always flows from the jacks to the tank through the valve. The upper flow out path is joined to the lower jack and the lower flow out path is joined to the upper jack. It maintains and controls the potential difference of hydraulic oil between the two jacks. And the rods push up and down the handles of the valve when the valve moves up and down with the bottles of the hydraulic jack.

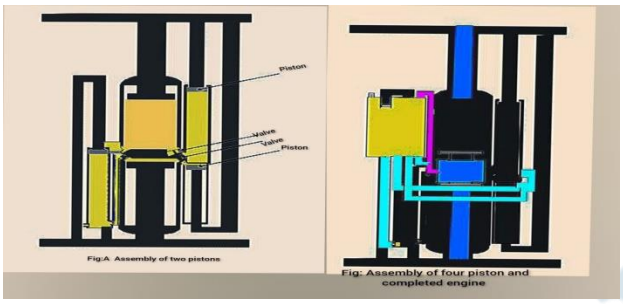

Figure 2: Assembly of Jack and Pistons

Base plates of both the jacks, where a highly potential difference created due to the presence of hydraulic oil in a single jack. There are two piston assemblies for pumping a single jack and four for two jacks as shown in fig: 2. There are two piston assemblies (one pumping piston is joined to the saddle of a jack and another pumping piston is joined to the saddle of another jack) for pumping a single jack and four piston assemblies for two jacks. as shown in fig: 2.

Figure 3: Assembly of racks and jacks

Due to the movement (up and down) of the jacks, the rack transmits the power to the gearbox by a reverse pinion.

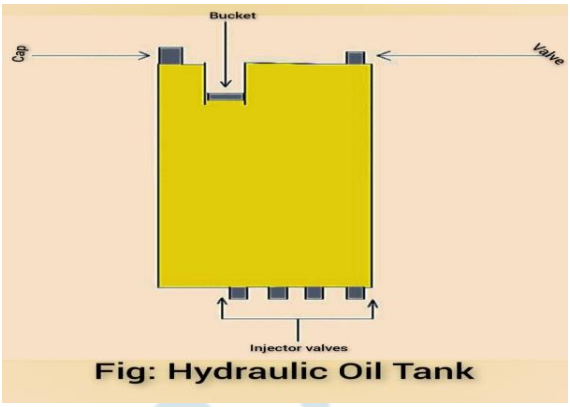

Figure 4: Schematic of Hydraulic oil tank

It contains the hydraulic oil for the system of the engine and there is a free moving bucket (pressure controller), reduces the high pressure and low pressure induced by the system. It utilizes a flow in path, four flow out paths, a cap and a free moving bucket. The free moving bucket (pressure controller) reduces both the high pressure and low pressure induced by the system.

III. IMPROVEMENT OF EFFICIENCY

A. Conservation of Gravity

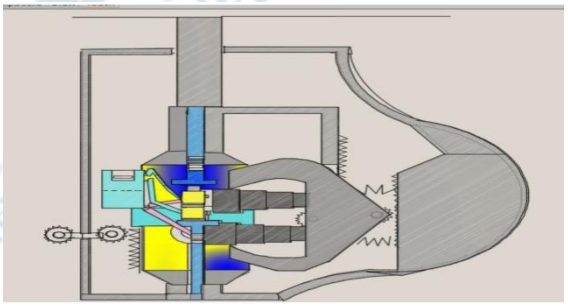

Figure 5: View of Engine

The efficiency of this engine is so less. The engine was arranged by the assembly of crankshaft, hydraulic tank, common release valve, racks, pinions etc. The main source of power of the engine is the weight of the vehicle. As the weight of the vehicle increases, the power of the engine also increases.

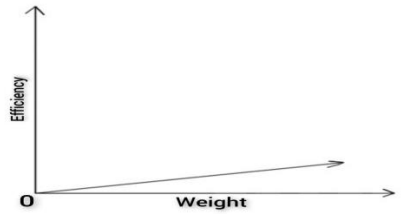

Figure 6: Graph between weight of the Vehicle and efficiency

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B. Conservation of Gravity

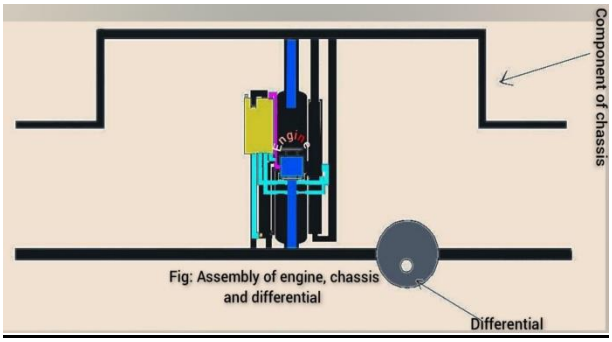

Figure 7: Front view of the engine

The chassis contains the maximum weight (source of power) of the vehicle and it provides the power to the engine. The saddle of the upper jack is joined to the chassis and the saddle of the lower jack is joined to the differential of the vehicle. The force due to the weight of the vehicle pushes the pistons and the pumping pistons start pumping. Due to the highly potential difference of hydraulic oil between the two jacks, the jack releases the oil which was already filled up with oil. And same process goes for another jack.

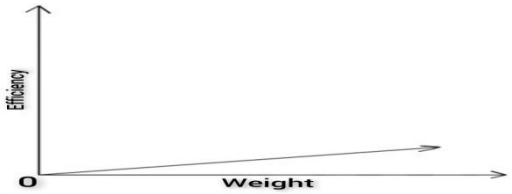

Figure 8: Graph between weight of the Vehicle and efficiency

C. Conservation of Leaf Spring Force

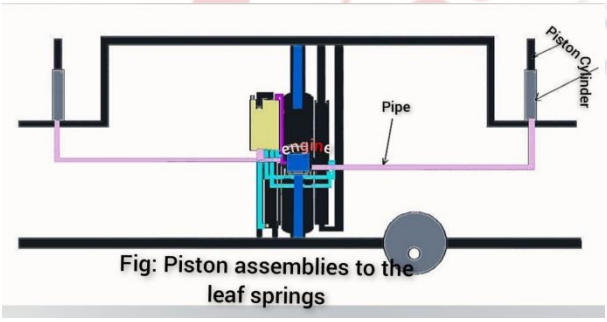

Figure 9: Front view of the engine

In the second revolution, the efficiency of the engine was not satisfactory. Therefore, by using of two piston assemblies in the leaf springs, we can increase its efficiency. Therefore, by placing two more piston assemblies at the middle point of leaf spring, the pistons can be pumped by the jumping of spring. From this process, extra power can be conserved and we are able to increase the efficiency of the engine by conserving the leaf spring force.

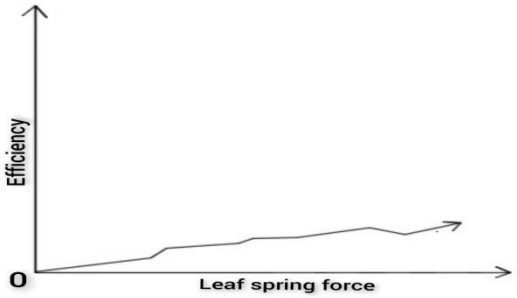

Figure 10: Graph between leaf spring force and efficiency

D. Conservation of Kinetic Energy

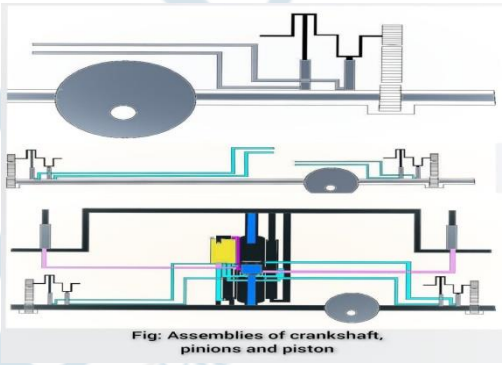

Figure 10: Front view of the engine

In the third revolution, the efficiency was satisfactory but the piston assemblies of leaf springs do not work perfectly on the plane road. Conserving the kinetic energy by the arrangement of four more piston assemblies which involve crankshaft and pinions. Therefore, more energy sources were investigated. So, we are able to conserve some amount kinetic energy from motional inertia of the vehicle. As mechanisms for the system, four more piston assemblies are added. Which involve two crankshafts, four helical teeth pinions and two hydraulic pipes. In this way we have the sources of power; gravity, leaf spring force and kinetic energy and those provide the batter efficiency to the engine.

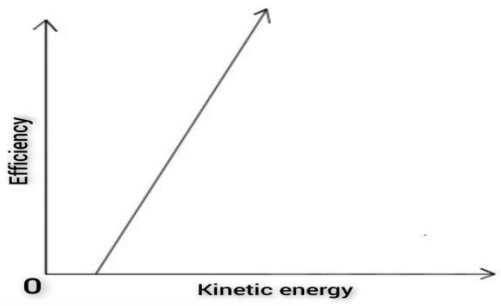

Figure 11: Graph between kinetic energy and efficiency

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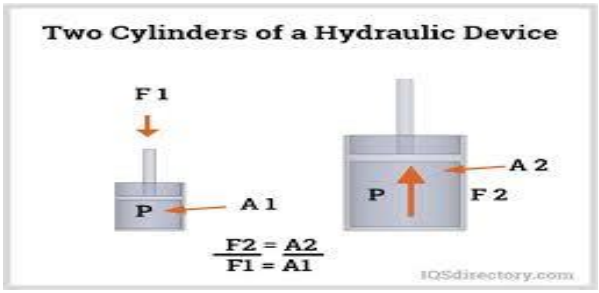
IV. MATH



By Pascal's Principle, the pressure would be the same in the larger cylinder, but since the larger cylinder has more area, the force emitted by the second cylinder would be greater. This is represented by re-arranging the pressure formula P = F/A, to F = PA. From this formula, $F_2=F_1A_2/A_1$ is used for the jack, where, F_1= Applying force, F_2= Lifting force, A_1= Area of the pumping piston, A_2=Area of the lifting piston. The formula for measurement the radius of the pistons will be

½ (radius of the lifting)^2 = (Radius of the pumping piston)^2.

V. UNITS

Metre (m), Metre^2 (m^2), Metre Second^{-1}(ms^{-1}), Newton (N), Pascal (Pa), Revolution Per Minute (rpm).

VI. ABBREVIATIONS AND ACRONYMS

C.R.V. (COMMON RELEASE VALVE), F.L.E. (FUEL LESS ENGINE), N.C.E (NON-COMMON ENGINE).

VII. CONCLUSION

The cost for the manufacturing of the engine is not so high and moreover, the engine is eco-friendly one. There is no need of extra investment for fuel to run the engine. So, its popularity is satisfactory. Both the industrialization and commercialization will be attractive. Moreover, we are able to conserve the sustainable energy sources and control many types of environmental problems related to the combustion of fuel.

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