Dual Internal Combustion Engine

Bharath Raman S[1] Anthony Rishab Paul[2] Akash A[3] Rohith K[4] Chethan K S[5]
[1,2,3]UG Student [4,5]Assistant Professor
[1,2,3,4,5]Department of Mechanical Engineering
[1,2,3,4,5]NMIT, Bangalore, India

Abstract— The dual internal combustion engine comprises a cylindrical body and a piston provided in a cylindrical body. The piston includes a double acting piston head connected to a piston rod at one end of the double acting piston head and divides the cylindrical body into two combustion chambers. The end of the piston rod is connected to a crank shaft through the second combustion chamber. The dual internal combustion engine further includes a series of lubrication nozzles on the cylindrical body wall to lubricate the combustion chambers and the piston, and a series of sealing rings along the piston rod. The combustion in the first combustion chamber takes place above the double acting piston head and the combustion in the second combustion chamber takes place below the double acting piston head. The engine is compact, the overall weight of the engine and the power output is increased.

Key words: Dual Internal Combustion Engine, Double Acting Piston, Scotch Yoke

I. INTRODUCTION

The internal combustion engine is a heat generating engine where the combustion of the fuel occurs with usually air in the combustion chamber that is a core part of the working fluid flow cycle. In an internal combustion engine the expansion of high temperature and high pressure gasses produced by combustion applies direct force to the components of the engine .The forces applied typically to the piston, turbine blades, rotor blades and nozzle. This force moves the components over a distance, transforming chemical energy into useful mechanical energy.

The first commercial successful internal combustion engine was created by Etienne Lenoir in the year 1859 and the first modern internal combustion engine was created in the year 1876 by Nikolaus Otto.

The term internal combustion engine usually refers to an engine in which combustion occurs like the familiar four stroke and two stroke piston engine, along with variants, such as the six stroke piston engine and the rotary engine.

II. MECHANISM USED

This system consists of combination of the common four stroke engine and scotch yoke mechanism.

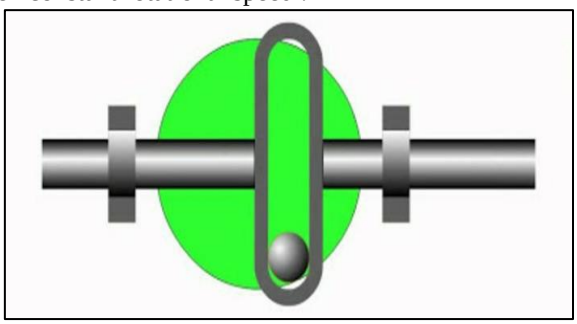
A. Working of a Four Stroke Engine:

A four stroke engine is an internal combustion engine in which the piston completes four strokes while turning the crank shaft. A stroke refers to the full travel of the piston along the cylinder in either directions. The four separate stokes are termed as:

1) Intake
2) Compression
3) Combustion
4) Exhaust

B. Scotch Yoke Mechanism:

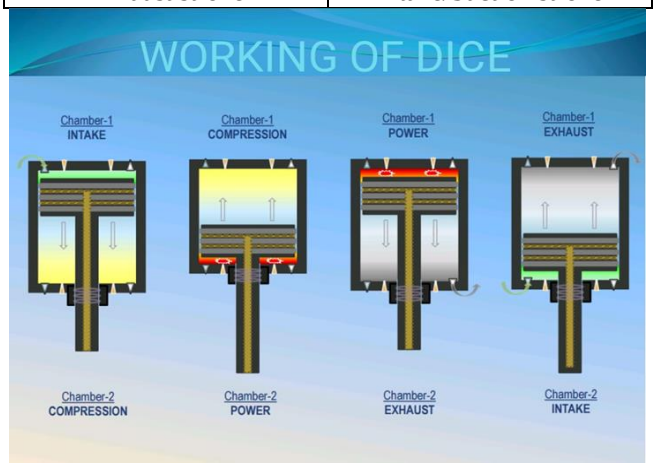
The scotch yoke is a reciprocating motion mechanism converting the linear motion of a slider into rotational motion or vice versa. the piston or other reciprocating parts is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part the location of the piston verses time is a sine wave of constant amplitude and constant frequency for a given constant rotational speed .



III. WORKING OF DICE

Dual internal combustion engine works in a similar working of a four stroke internal combustion engine. DICE completes two power strokes in four strokes. Dice consists of two combustion chambers and the variation in the strokes in the combustion chambers are shown in the table:

COMBUSTION CHAMBER 1	COMBUSTION CHAMBER 2
Intake/Suction stroke	Compression stroke
Compression stroke	Power stroke
Power stroke	Exhaust stroke
Exhaust stroke	Intake/Suction stroke



IV. SEALING DESIGNS

We have used a sealing mechanism which is different when compared to a normal four stroke engine .in this mechanism the Sealing rings are fitted in bottom cylinder head .This is proven to be more compact and reduces friction to a great

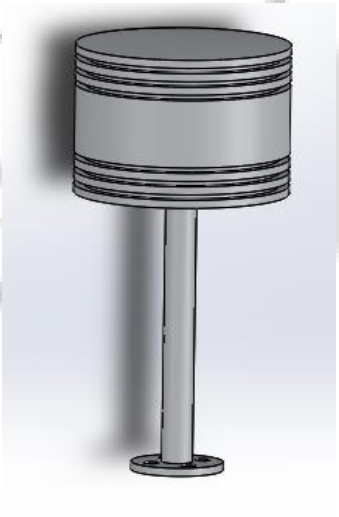
All rights reserved by www.ijsrd.com

extent. This type of sealing ensures less material used and a smaller connecting rod which is the desirable design for the dual internal combustion engine.

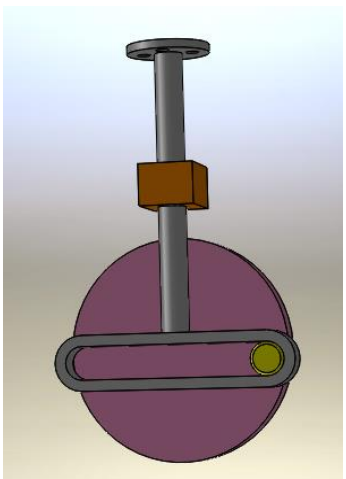
PARAMETERS	SEALING RINGS FITTED IN THE BOTTOM CYLINDER
Geometric Simplicity	Reduces the complexity of requirement of bigger engine due to better weight ratio
Modularity	Assembly and disassembly is easy
Maintenance	Similar to a four stroke engine
Spatial Constrains	Minimum with respect to a four stroke engine
Structural Stability	Stable structure
Cost Benefit	Beneficial as it increases fuel economy and reduces material requirements
Kinematics	Vary compact when power to weight ratio is consider
Operational Skills	Needs skilled operator
Smooth Operation	Smoother compared to a four stroke as power stroke is reduced by half

V. DESIGN OF D.I.C.E

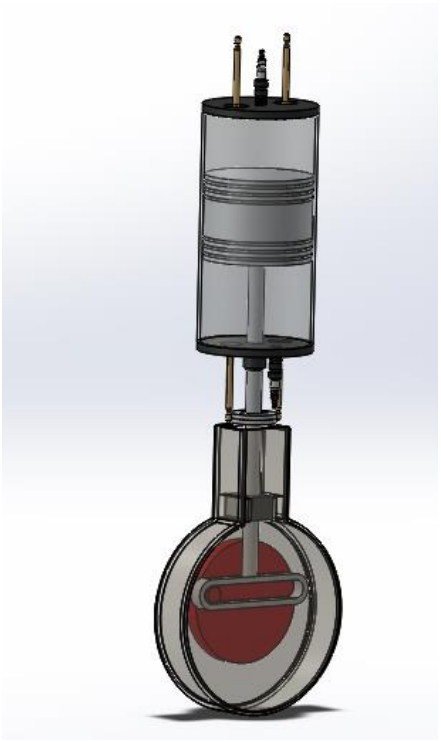
A. Piston:



B. Scotch Yoke Crank Shaft:



C. Final Design of D.I.C.E:



VI. ADVANTAGES OF D.I.C.E

1) Better power to weight ratio.
2) Reduced internal friction.
3) Lower material, weight and seize for same power generation.
4) Smother operation.
5) Greater range of cylinder bore and stroke ratio.
6) Compact design.

VII. FUTURE WORK

Implement D.I.C.E to replace or applications of current four stroke engine.

REFERENCE

Links

[1] https://patents.google.com/patent/WO201305461A3/en - Bharath Raman S
[2] https://www.google.co.in/search?scotch+yoke+mechanism

Books

[3] Internal combustion engine - V Ganesan
[4] Internal combustion engine – Jhon B Heywood
[5] Introduction to internal combustion engine – Richard Stone

All rights reserved by *www.ijsrd.com*