

# PRIMARY DESIGN OF OSCILLATORY SHAFT ENGINE RESULTING HIGHER ENGINE EFFICIENCY

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**Abstract**—The purpose of this research is to design and suggest a new mechanism other than the very conventional inversion of single slider crank chain mechanism to be used in highly versatile internal combustion engines mainly used in automobiles. Yet another objective of the invention is to provide a structure for the internal combustion engine with no hot load bearing sliding elements. Although it will definitely take time to change the existing design and implement the new design suggested but it will definitely transfer motion more efficiently and in turn will produce more power output. The advantage of getting higher efficiency will definitely reduce the fuel consumption and look at a lucrative option but there is also a secondary advantage of this oscillatory shaft engine which is of lesser initial cost. It is evident when investigating the cycle of internal combustion engine, only 40% or lesser amount of heat energy is converted in to useful work and the major part of energy is dissipated as losses. This new INTERNAL COMBUSTION ENGINE generates 1.55 times higher.

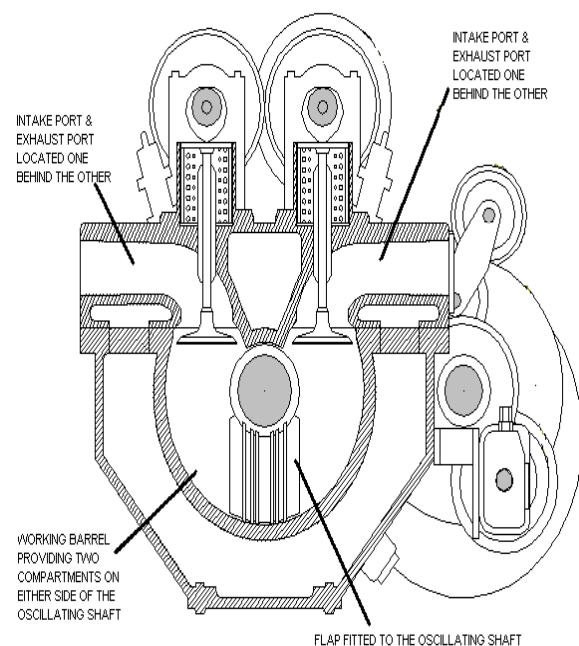
**Keywords:** slider, mechanism, consumption, oscillatory, automobiles, efficiency, dissipated

## I. INTRODUCTION

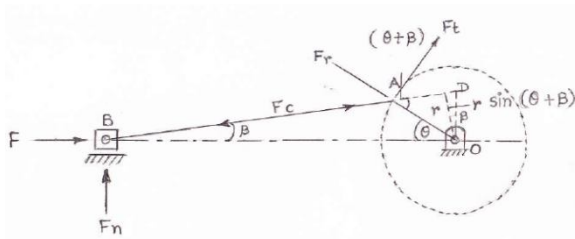
This engine does not apply crank gear for power generation, which usually generates a considerable internal resistance to the system. During idle running power is spent merely to overcome the internal resistance. So that oscillator engine consume very small amount of fuel during idle running. Similarly, to start the engine, it requires a small battery power. In conventional engine there is always a lateral thrust developing on cylinder walls by the piston rings, resulting wear of the engine parts. In oscillator engine no lateral thrust is acted on walls of the working barrel, and the engine can operate for a long period. Oscillator engine is having two compartments generating two working spaces. As a result the engine dimensions are reduced, as well as the weight. The oscillator engine is having a higher efficiency with all this factors, and the emissions of exhaust gases will be lesser, minimizing the environmental pollution. Oscillator engine is having two compartments generating two working spaces. As a result the engine dimensions are reduced, as well as the weight. Oscillator internal combustion engine is introducing an innovative technology to substitute pistons and crank gear with oscillating flaps. Its high performance mechanism eliminates the problems met with crank gear, typically the internal resistance and claiming higher efficiency, higher power, lighter weight, least starting effort, fuel saving in idle running, and miniature starting power source. These conditions lead to most essential requirements of an ideal internal combustion engine and special demands that cannot met with a conventional power generator. In a typical low compression engine, the thermal efficiency is about 26% while a highly improved engine it will be about 34%. Main reason to drop the thermal efficiency is the mechanical resistance

generated by crank gear. Oscillating internal combustion engine comprising : a body ,said body includes a generally cylindrical cavity there in; an oscillator mounted rotatable in said cylindrical cavity placed in the engine body, said oscillator includes a cylindrical cavity therein; an intermediate eccentric mounted rotatable in the cylindrical cavity placed in the engine oscillator, said intermediate eccentric includes a cylindrical cavity therein; a shaft, said shaft having one end, the other end and an eccentric, wherein said eccentric of said shaft is rotatable mounted in the cylindrical cavity of the intermediate eccentric and both the ends of said shaft are mounted rotatably in the engine body

## Oscillatory shaft engine diagram



**II. DESIGN ANALYSIS AND CALCULATION**



**Fig a**

Conventional engine

Piston effort(effective driving force)

A1= area of the cover end

A2= area of the piston rod end

P1= pressure on the cover end

P2= pressure on the rod end

M= mass of the reciprocating parts

Force on the piston due to gas pressure  $F_p = P_1A_1 - P_2A_2$

Inertia force  $F_p = mf = mr\omega^2(\cos\theta + \cos 2\theta/n)$

Net effective force on the piston,  $F = F_p - F_b$

Force on piston,  $F = F_p - F_b - F_f$

1. Force on the piston  $F = F_p + mg - F_b - F_f$

2)-Force (thrust) along the connecting rod

Let  $F_c$  = Force in the connecting rod

Then equating the horizontal components of forces,

$$F_c \cdot \cos\beta = F \text{ or } F_c = F / \cos\beta$$

3)-Thrust on the sides of cylinder

It is the normal reaction on the cylinder walls

$$F_n = F_c \sin\beta = F \tan\beta$$

4)-Crank effort

$F_t$ =crank effort

$$F_t \cdot r = F_c \cdot r \sin(\theta + \beta)$$

$$F_t = F_c \sin(\theta + \beta)$$

$$= F / \cos\beta \cdot \sin(\theta + \beta)$$

5) Thrust on the bearing

$$F_r = F_c \cos(\theta + \beta) = F / \cos\beta \cdot \cos(\theta + \beta)$$

in conventional engine the losses are more as explain

as due to

- a) thrust on the bearing
- b) crank effort
- c) thrust force along connecting rod
- d) force on piston

as in the oscillatory shaft engine these losses can be reduced and it will give better performance and more efficiency as compare with the conventional engine

Stroke volume=251 cubic centimetre

Clearance volume = 28 cubic centimeter

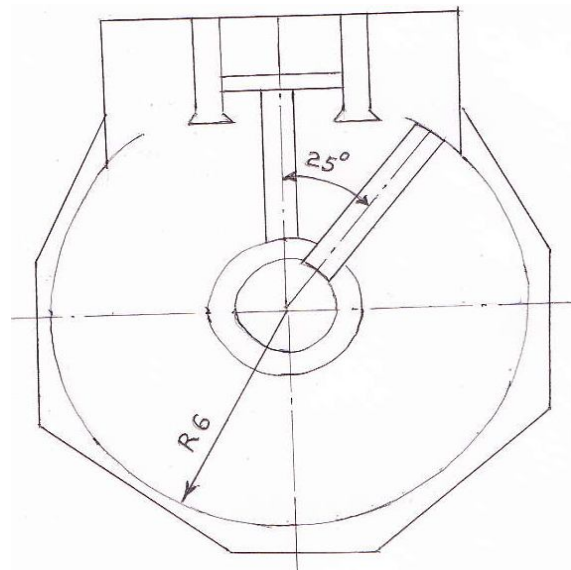
Compression ratio (r)

= (stroke volume + clearance volume) /clearance volume

Compression ratio (r) =9.964

**III. CALCULATION OF DIMENSION OF THE OSCILLATORY SHAFT ENGINE**

The purpose of introducing the new power generation technology is to eliminate the power losses taken place in the internal combustion engine, during conversion of piston movement in to rotary movement of crankshaft.

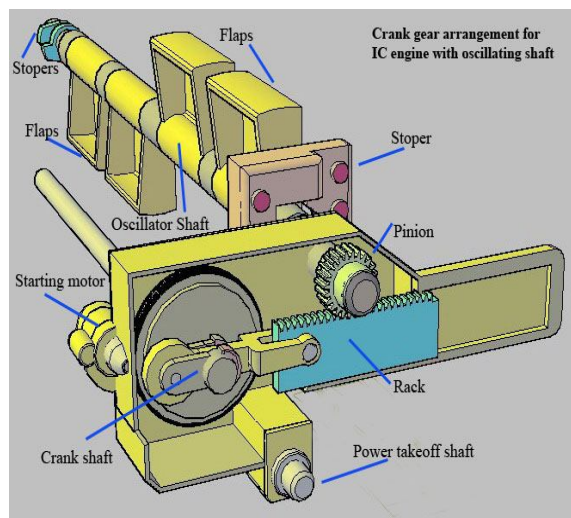


**Fig b**

$$\begin{aligned} \pi(ro^2 - ri^2) \cdot 285/360 \cdot b &= 251 \text{cc} \\ 89.5 \cdot b &= 251 \\ b &= 2.80 \end{aligned}$$

$$\begin{aligned} \pi(ro^2 - ri^2) \cdot 25/360 \cdot b &= 28 \\ (r^2) \cdot (b) &= 128.4 \\ b &= 3.56 \text{ cm (width of the engine)} \\ r &= 6 \text{ cm (radius of the engine)} \\ &\text{as shown in the fig b;} \end{aligned}$$

#### IV. OSCILLATORY SHAFT ENGINE MECHANISM



#### V. ASSEMBLY OF OSCILLATORY GENERATOR

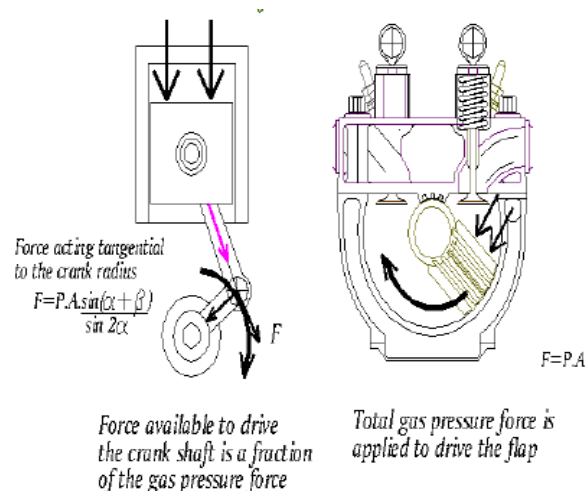


#### VI. THEORETICAL ANALYSIS

Parameter/feature	Value
Width of engine (b)	35.6 mm
Stroke volume	251 cc
Radius of working barrel	60 mm
Flap length	Equal to inner diameter of working barrel
Clearance volume	28cc
Compression ratio	9.964

Flap position		
position	Degree	Rotation direction
Initial extreme position	25degree right from centre axis	Clockwise
Final extreme position	25 degree left from centre axis	-

#### VII. COMPARISON ON CONVENTIONAL AND OSCILLATORY SHAFT ENGINE



#### VIII. CONCLUSIVE REMARKS

While implementing the oscillatory engine in future we can ameliorate the fuel. This paper will definitely become advantageous for future research in the same direction to obtain better motion transmission mechanism. We should stick strictly with this mechanism and should design on entirely automobile with it. At the initial level it looks tedious but become profitable in a long run. It might be possible that offers a decade the basic single slider crank chain mechanism (at present in use) may become obsolete. Efficiency and pollution can be abated. Unlike conventional engines there are no lateral thrusts acting so that it will last for long period. Now a days we are concerning about achieving more power with minimum usage of fuels for that we can replace conventional IC engines by oscillator engines. Oscillator Engine is an evolution of Internal Combustion Engine; it redefines the efficiency, performance and reliability. It is applicable for all power applications from basic engine to complete power system and from automobile to stationary power plant. It consume lesser fuel, and environmentally friendly.

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