

## VESELOVSKY Rotary-Piston Engine

### *Fields of application:*

Car-building, low-weight internal-combustion drive for agriculture technique, light aviation, shipbuilding.

### *Description:*

It is generally recognized that Wankel-type rotary engines possess a number of essential drawbacks that hinder considerably its practical applications. Namely, Wankel engine inlet and outlet openings are connected for some time that results in efficiency loss of up to 15-30%. This leads also to non-stable work at low rotations and ecologically harmful exhaust.

The proposed construction of Veselovsky rotary-piston engine does not have these disadvantages and at the same time holds its main merits: compactness, simplicity of design, low-weight.

The construction of Veselovsky rotary-piston engine is distinguished principally in several basic design components and operation features which are illustrated by the following table:

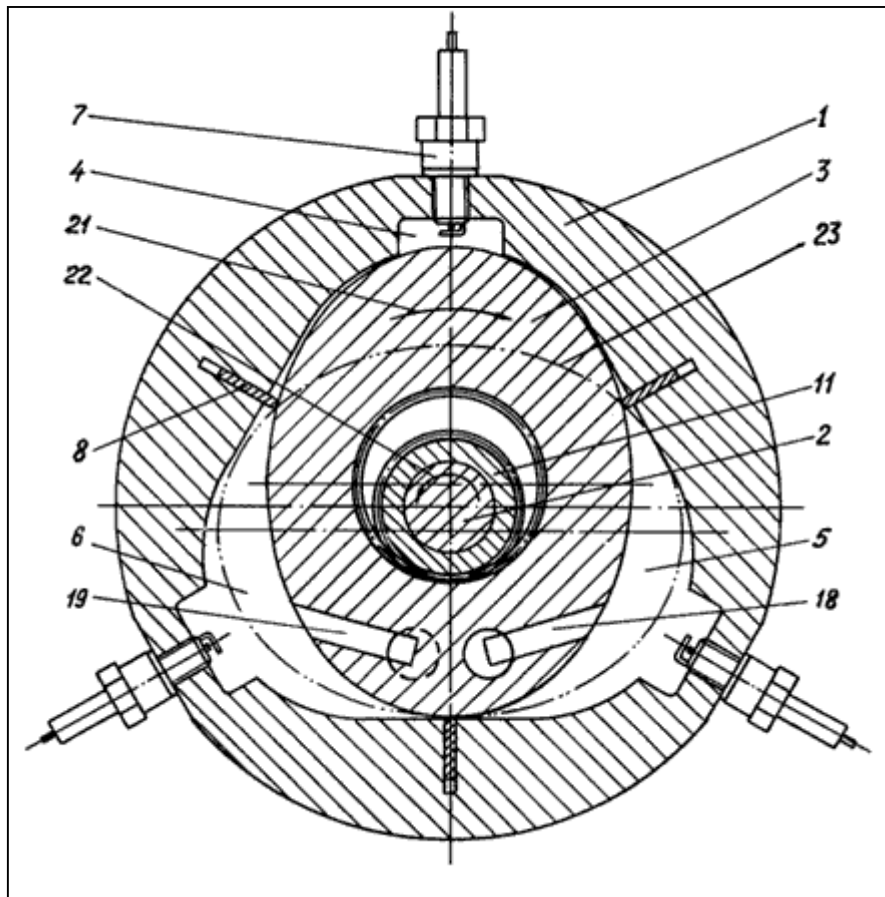
**Comparison of Wankel and Veselovsky rotary engines:**

Parameter	WANKEL	VESELOVSKY
Form of a working chamber	Oval	Triangle
Form of a rotor	Triangle	Elliptical
Type of rotation for rotor and axis	One direction. One rotor rotation falls on three axis rotations	Opposite directions. One rotor rotation falls on two axis rotations.
Location of sealing blades	On the tops of a triangle rotor	In the engine stator

The Veselovsky engine is the type of rotary-piston internal combustion engine with the planetary movement of the rotor-piston. It realizes the full four-stroke cycle of a thermodynamic process. The Veselovsky engine has the *improved system of gas-exchange*. It is known that gas-exchange openings in both Wankel and conventional engine are located in a fixed stator, i.e. they are relatively distant from either rotor or from piston. In adjacent zones it results in increased pressure during exhaust and in pressure lowering during inlet. It means that in both cases the process of exhaust escape and fuel inlet runs under less favorable conditions. On the contrary the gas-exchange windows of the Veselovsky engine are located at the periphery of the elliptical rotary-piston and follow ("track") the zones of pressure changes. Such dynamic location of gas openings allows to obtain the optimal operation features: to have perfect gas exchange, to increase fuel efficiency, to get secure start of a cold engine, to reduce toxicity of exhaust.

The special *sealing system* has been developed for Veselovsky engine. Its reliability is comparable with a conventional engine and exceeds that of for any type of known rotary engines.

Veselovsky rotary-piston engine is distinguished with the new *efficient system of synchronization of stator - rotor - eccentric axis*. It is based on the closed planetary tooth gear that provides for absolutely precise synchronization. It excludes totally the undesired displacement in interference gap between rotor and eccentric axis. It eliminates also vibrations and shock loads in a gear unit (as it takes place in Wankel-type engine).



*Fig. 1. A diagram of Veselovsky rotary-piston engine.*

The engine composed from the following main components (see Fig.1):

- 1 - stator with the three-element working chamber (5) representing an equilateral triangle;
  - 2 - eccentric axis (providing for two rotations in one period of rotor-piston);
  - 3 - elliptical rotor-piston which is eye-jointed to the eccentric axis (2);
  - 4, 5, 6 - working chambers;
  - 7 - candle;
  - 8 - double spring-backed sealing elements;
  - 18, 19 - gas exchange system;
  - 11 - synchronizing gear unit providing for kinematics connection between stator, rotor-piston and eccentric axis and special side sealing elements which are not shown;
- The design allows to create a multi-unit engines with power up to 300-400kW.

#### *Advantages:*

Veselovsky rotary piston engines offers the following advantages over Wankel rotary motor:

- Principally new kinematics scheme which provides for precise synchronization of stator-rotor-eccentric axis;
- Safe system of inlet and exhaust gas exchange which allows to have ecologically clean exhaust.
- New system of sealing blades positioned on a stator. The sealing provides for effective gas exchange and has reliability as that of reciprocating motor.
- Veselovsky design can function in regimes of both hydraulic pump and hydraulic motor what is not attainable for Wankel engine.
- Veselovsky engine is characterized with high fabricability, it does not require either expensive materials or special equipment and particular technological processes.

#### *Stage of Development:*

The working capacity of Veselovsky design has been verified by the example of rotor piston hydraulic machine that possesses the same kinematics scheme and works in both regimes: as hydraulic pump and hydraulic motor (what is not true for Wankel-type engine). The basic elements of Veselovsky engine are applied for international patenting.

*Proposals for cooperation:*

Joint co-development; license contract.

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