

Problem Statement

Nowadays the anthropogenic impact on the environment has significantly increased. One of the pollution causes is a sharp increase in the number of internal combustion engines that significantly pollute the environment. The problem of creating environmentally clean engines or ones with reduced emission level has become very urgent.

Purpose

To create an external combustion heat engine, which is deprived of the shortcomings of similar engines, and is going to be used in jet ships.

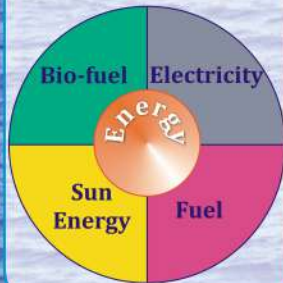
Research Procedure

1. Consider and analyze existent heat-engines, find out their pros and cons.
2. Develop the construction of new engine which would not have the disadvantages of existent analogues and prototypes.
3. Evaluate basic operating parameters of the developed engine.
4. Create the working model of the developed engine and check it experimentally.

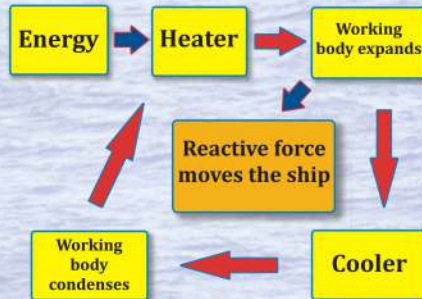
Working model



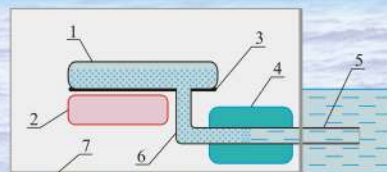
Kinds of energy



How it works

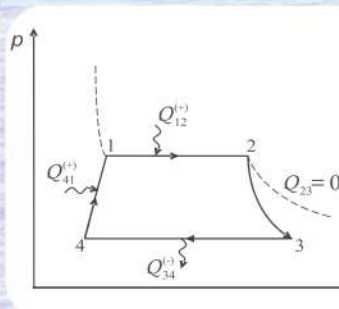


Structure



1. Working cylinder
2. Combustion chamber
3. Heater
4. Cooling radiator
5. Jet nozzles
6. Steam conductor
7. Ship

Principle of operation



During process 1→2 working body (liquid) receives heat from the combustion chamber. Working body expands and evaporates causing overpressure. After that water escapes from jet nozzles with constant speed creating reactive thrust force and the ship starts to move. By the moment when all the liquid has evaporated (point 2) the heater turns off, but the working body continues to expand until its pressure is comparable to atmospheric (process 2→3). During that process temperature also decreases - from maximal value during process 1→2 to minimal at process 3→4. At point 3 fluid pressure becomes equal to atmospheric and water stops to escape. Further, the cooler takes heat from working body, causing it to compress and finally condense (point 4). Then the heater is turned on, working body heats up, and the whole process starts over again.

Video demonstration

Advantages

1. Reduction of pollution level in the atmosphere. In the case of complete fuel combustion, exhaust-gas will consist only of water and carbon dioxide, which are usually not considered to be contaminants.
2. The vibration and noise in the well balanced engine is almost absent, because combustion takes place constantly and at atmospheric pressure.
3. Relative simplicity of construction.
4. In the engines of external combustion it is possible to use any source of energy: different types of fuel, sun energy, nuclear reactor and others like that.
5. Long lifetime - the mechanisms for the transmission of mechanical energy from a working body to water are absent - least amount of the moving parts.
6. The engine has high efficiency, and low price due to absence of losses while transmitting the energy.
7. There is no environmental impact on the engine due to the separation of the combustion chamber and the vaporizer.
8. The ship control can be simplified; put a longitudinal keel that divides water in the jet nozzle in two halves - rotation of the keel changes the direction of jet force and causes the ship to turn.

Application

Offered technical solution can be used as a motive device of marine and river transport and as a demonstration model for an educational physical experiment.