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DEVICE FOR CLEANING FLUE GASES OF SHIP POWER PLANTS

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Introduction

This text is devoted to the problem of discharging emissions of ship propulsion systems into the environment. The MARPOL Convention sets emission levels for ships built at a certain time. In order to reduce the cost of purchasing fuel with a high degree of purification and at the same time not to pollute the environment, it is possible to use a method of gas purification that will be implemented in a compact and reliable device, which can be offered by us.

Main part

We propose to solve this problem by installing a supercharger connected to a shell-and-tube heat exchanger, which acts as a pre-cooling gas, connected to a mixing chamber connected to the confuser of the first ejector heat exchanger (TOE), and through the exhaust pipe from the power plant on ships. (gases leaving after combustion in the power plant) - with the environment. The first TOE comprises a series-connected confuser, inside which at the outlet is a first nozzle connected to a container for refrigerant, and a diffuser. The output of the diffuser of the first TOE is connected to the confuser of the second TOE. The second TOE contains a series-connected confuser, inside which is the outlet of the second nozzle, combined with a water tank, a mixing chamber and a diffuser. The output of the mixing chamber of the second TOE is connected to a suitable diffuser connected to the liquid separator. Figure 1 shows a diagram of our device

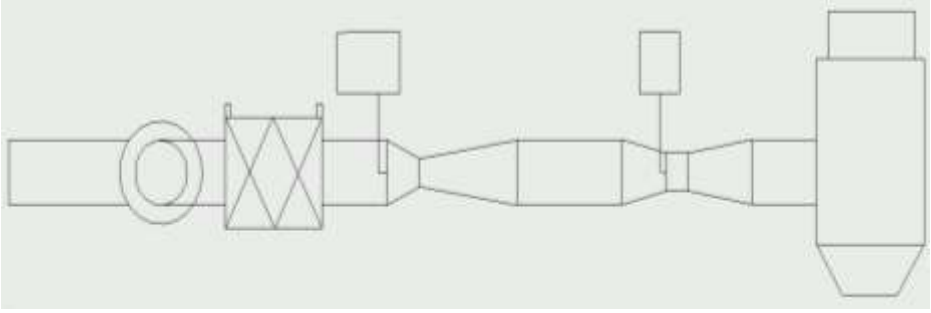

Fig.1 Scheme of the flue gas purifier

The flow of flue gases, after passing the standard filters, enters the shell-and-tube heat exchanger through which the fuel of the power plant passes. What is needed to reduce the density of the fuel before injecting it into the installation where it is mixed with air is blown by a fan from the environment and sent to the first ejector heat exchanger, in which water is injected for further cooling in the form of fine droplets. The stream is cooled and saturated with water vapor, in some cases the chemical compounds of sulfur react with water. Then the flow enters the second ejector heat exchanger, which is injected with refrigerant (liquid nitrogen or carbon dioxide). The stream cools instantly. Water vapor first condenses and then freezes, turning into fine ice crystals, which are the centers of crystallization for sulfur chemicals.

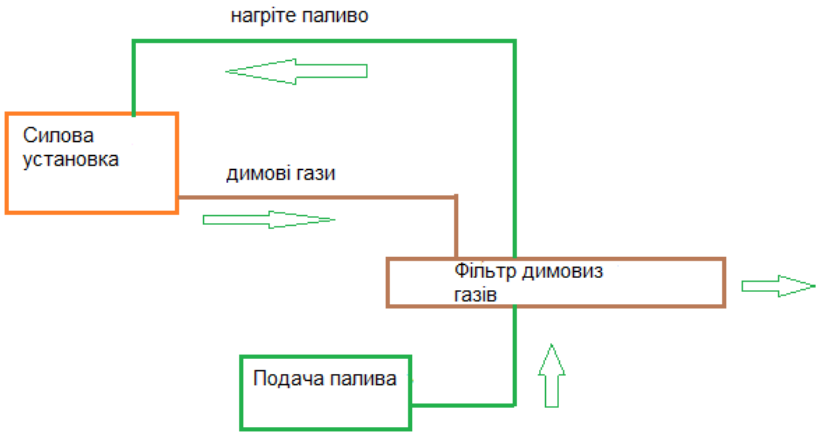

Fig. 2 Scheme of flue gas heat use for fuel heating

The shell-and-tube heat exchanger which pre-cools the flue gases has the fuel of the power plant as a heat carrier. Since the fuel has a number of properties that change with temperature, the fuel undergoes special training before submission to the installation. By removing heat from the flue gas, the utilization of secondary heat sources is realized. The scheme of this process is shown in Fig. 2.

Conclusions

The maritime transport sector is very relevant today, and work on emission treatment is an important area. Our proposed device has the ability to provide a high degree of purification, some utilization of secondary energy sources, and reliable operation. Patent applications are being prepared for this device.

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