AP15473335 "Development and research of ultrasonic method of cleaning of exhaust gas of internal combustion engines of transport vehicles" – p.m. Sarsembekov B.K.

Relevance:

The research hypothesis is the possibility of exhaust gas purification through the action of an ultrasonic emitter located in the vehicle's muffler, and increasing the hydrodynamic coagulation of exhaust gases from the internal combustion engine of a vehicle. The relevance of the research is determined by the lack of such a design and methodology for its study.

Objective of the project:

The objective of the research is to obtain results that allow for the calculation, design, and development of a prototype ultrasonic vehicle muffler for exhaust gas purification in internal combustion engines of transport vehicles.

***Achieved Results**:*

During the research on the purification of exhaust gases from vehicles to remove harmful impurities and soot particles, the following results were **achieved:**

- A report and user manual have been prepared, along with a technical assignment for designing an ultrasonic vehicle muffler for the purification of exhaust gases from internal combustion engines of transport vehicles. The ultrasonic vehicle muffler is an additional equipment designed for cleaning exhaust gases from harmful impurities, connected to the exhaust system of a vehicle and transport equipment;

For 2024, the following publications were made:

1) Kadyrov A., Bembenek M., Sarsembekov B., Kukesheva A., Nurkusheva S. The Influence of the Frequency of Ultrasound on the Exhaust Gas Purification Process in a Diesel Car Muffler // Applied Sciences. - 2024. 14 – 5027. ISSN 20763417 DOI: https://doi.org/10.3390/app14125027. (Q1/79-й процентиль по базе Scopus). https://orcid.org/0000-0002-4815-1823

2) Adil Kadyrov, Bauyrzhan Sarsembekov, Aliya Kukesheva, Kirill Sinelnikov Application of electric pulse and ultrasonic mufflers for increasing the degree of exhaust gas purification in car engines // International Journal of Innovative Research and Scientific Studies. - 2024, P.33-40. Online ISSN : 2617-6548. DOI: https://doi.org/10.53894/ijirss.v8i1.3570 (Q1/79th percentile in Scopus database). https://orcid.org/0000-0002-4815-1823

3) Sarsembekov B.K., Kadyrov A.S., Kunayev V.A., Issabayev M.S., Kukesheva A.B. Experimental Comparison of Methods for Cleaning Car Exhaust Gas by Exposure Using Ultrasound and Laser Radiation // Material and Mechanical Engineering Technology, No.3, 2024. ISSN 2706977X DOI: https://doi.org/10.52209/2706-977X_2024_3_44

Obtained protective documents:

In 2024:

1) Kadyrov A.S., Sarsembekov B.K., Kadyrova I.A. Ultrasonic Muffler for Exhaust Gas Purification of an Internal Combustion Engine. Patent RK No. 9263, 21.06.2024.

2) Sarsembekov B.K., Kadyrov A.S. Experimental Study Results on Exhaust Gas Purification of Transport Vehicle Engines Using Ultrasound. Certificate of Registration in the State Copyright Registry of RK No. 48542.

Positive results were obtained from experimental research on reducing smoke (light transmission attenuation coefficient) depending on the crankshaft rotation frequency of the engine, with and without the effect of ultrasound at frequencies of 25, 28, and 40 kHz (Figure 1).

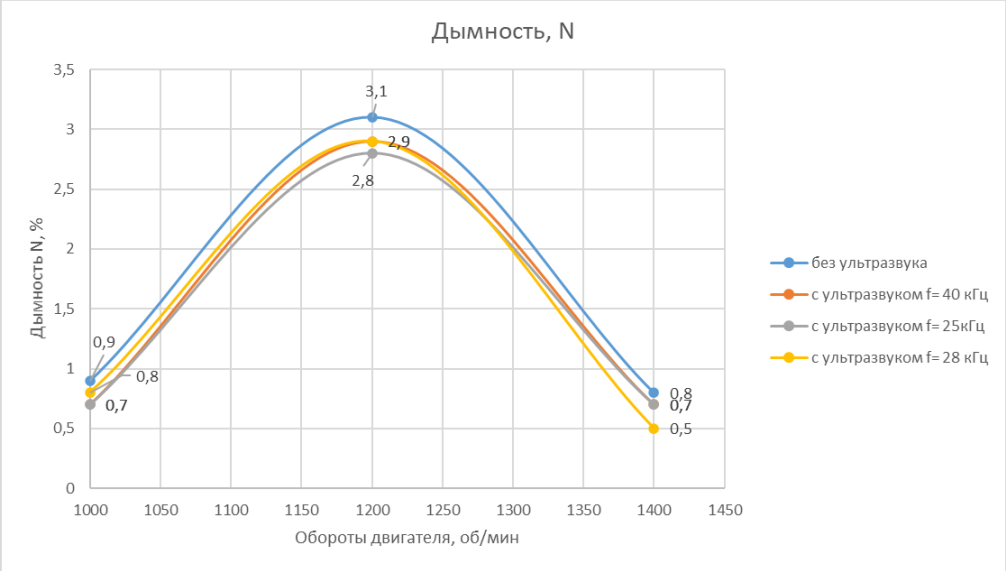

Figure 1 - Dependence of smokiness (coefficient of attenuation of light flux) of exhaust gas on engine speed without ultrasound and under the influence of ultrasound at frequencies 40, 25, 28 kHz

List of Publications:

1. Sarsembekov B.K., Sinelnikov K.A., Suyunbaev Sh.M., Kukesheva A.B., Dyusenbaev E.S. Comparison of the efficiency of cleaning the exhaust gas of internal combustion engines of cars with ultrasonic emitters // Proceedings of the Ablykas Saginov Karaganda Technical University. -2023, No.3, C.284-290. ISSN 1609-1825 (Print), ISSN 2710-3382 (Online). https://tu.kstu.kz/archive/issue/98

2. Kadyrov A., Bembenek M., Sarsembekov B., Kukesheva A., Nurkusheva S. The Influence of the Frequency of Ultrasound on the Exhaust Gas Purification Process in a Diesel Car Muffler // Applied Sciences. - 2024. 14 – 5027. ISSN 20763417 DOI: https://doi.org/10.3390/app14125027. (Q1/79th percentile in the Scopus database). https://orcid.org/0000-0002-4815-1823

3. Adil Kadyrov, Bauyrzhan Sarsembekov, Aliya Kukesheva, Kirill Sinelnikov Application of electric pulse and ultrasonic mufflers for increasing the degree of exhaust gas purification in car engines // International Journal of Innovative Research and Scientific Studies. - 2024, P.33-40. Online ISSN : 2617-6548. DOI: https://doi.org/10.53894/ijirss.v8i1.3570 (Q2/69th percentile in the Scopus database). https://orcid.org/0000-0002-4815-1823

4. Sarsembekov B.K., Kadyrov A.S., Kunayev V.A., Issabayev M.S., Kukesheva A.B. Experimental Comparison of Methods for Cleaning Car Exhaust Gas by Exposure Using Ultrasound and Laser Radiation // Material and Mechanical Engineering Technology, No.3, 2024. ISSN 2706977X DOI: https://doi.org/10.52209/2706-977X_2024_3_44

5. Kadyrov A.S., Sarsembekov B.K., Kadyrova I.A. Ultrasonic Muffler for Exhaust Gas Purification of an Internal Combustion Engine. Patent RK No. 9263, 21.06.2024.

6. Sarsembekov B.K., Kadyrov A.S. Results of Experimental Research on Exhaust Gas Purification of Internal Combustion Engines of Transport Vehicles Using Ultrasound. Certificate of Registration in the State Copyright Registry of RK No. 48542.

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Information for Potential Users

A full-size ultrasonic vehicle muffler for exhaust gas purification has been manufactured. Theoretical and experimental dependencies have been obtained, allowing the determination of effective parameters for the ultrasonic vehicle muffler.

Scope of application

Transport Engineering. Automotive Transport.

Date of Information Update: 08.11.2024