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VEHICLE FOR TRANSPORTATION OF REFRIGERATED CARGO

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Perishable cargoes are transported in refrigerated vehicles, or refrigerated containers. The main volume of all refrigerated cargoes are meat, fruit, vegetables and fish goods. Shipment by sea is performed out on refrigerated or in cooler latitudes, vented vessels by rail in refrigerated cars (refrigerating units), wagons-thermoses, vehicles in trailers with refasten able, or in flasks. Sea transportation in refrigerated containers are growing very fast in the last.

Refrigerated vehicle is a vehicle with isothermal (insulated vans) equipped with refrigeration units, to maintain the certain temperature during transportation [1]. A refrigerator truck is a motor van, a refrigerated trailer or semi-trailer. However, auto refrigerator's functions does not include frost of transported product. According to the rules of transportation of appropriating cargoes they should be frozen before loading in to the car. All refrigerated vans are vehicles for special purposes and are not serial. In the majority of cases these motor vans gather individually and on the chassis of that car which is required by the customer. Nevertheless, there is a number of basic brands, most commonly used for the installation of refrigerators. From imported ones are: Hyundai, ISUZU, Mitsubishi, Mercedes Benz, Hino, Fuso and MAN. Domestic: KAMAZ, GAZ and SZAP.

HD 72, HD 78 and HD 120 are the most popular from Korean Hyundai models. They set the wagons, covered inside with plastic sandwich panels. It provides to easy instanation. Moreover, the lightweight design does not reduce its strength and makes this refrigerated van even more economical compared to models gathered in a traditional way. Vans Hyundai differ by a larger capacity and are widely used in the commercial transportation of food products.

Models are equipped with the highly effective freezing installations "Blizzards Maxims" or Global freeze 5100 (roof version). By the way, the last unit has been tested in a special laboratory and has proved very reliable. Perfect for using in various climatic conditions. And availability in a design of the van of partitions will give the chance to set different temperature conditions in cargo sections. The capacity of refrigerators on the chassis of Hyundai is up to 5.5 tons. Not in a less demand from businessmen and transport companies are refrigerators on the chassis of Japanese ISUZU trucks. The basic models are NQR75R and NQR75P. Usually, they are set Global freeze chillers or more powerful 5100 Global freeze 5900. The capacity of these vans is somewhat less than the Hyundai up to 3800 kg. However, the versatility of Japanese cars frame provide greater

variability when mounting them on different types of bodies and attachments (e.g. tail lifts Zepro RZ 10-135 S).

Out of competition GAS is the most suitable for the installation of refrigerated vans among the domestic brands. To be exact chassis models 3302, 33104 "Valdai", A21R32 NEXT and 3309. In some cases, at customer's request standard frame is additionally lengthened. Box van is usually made of durable plastic. As for the installation of refrigeration units, the most common variant - the domestic "Blizzard-standard" or Global freeze GF35. Capacity of gazelles, however, even lower than the "Koreans" and "Japanese" - only 3.4 tons. But they are not longer required. The main applications of refrigerators on the chassis of GAZ is intercity transportation.

Slightly more different than a possibility of refrigerator trucks based on other domestic KAMAZ car. For installation of a thermo box on it chassis of the following models are used: 4308, 4308 Euro3, 65115, 65117 and 43118. In this case, much greater choice and mount them refrigeration units: Thermo King V500, Thermo King V700, 5100 Global freeze, Global freeze 5900, "Blizzard-Maxim", self-contained refrigeration ZANOTTI DFZ 430. The capacity of refrigerators on the basis of KAMAZ – more than 9000 kg. These machines are mostly engaged in long haul special cargoes.

Analysis of existing structures shows that, despite some successes and achievements in the improvement of transport refrigeration advisable to consider issues of creating vehicles for the transport of refrigerated cargoes.

In 2016 within an initiative theme was designed construction of the vehicle for the transport of refrigerated goods (Figure 1), which comprises: a cargo vehicle, frame, power supply, a control unit, a compressor, a condenser, freight container, the evaporator, piping, piping connector assemblies. The task to be solved by the proposed invention is to increase the mobility and operational capacity through the installation of two cargo containers on a cargo vehicle.

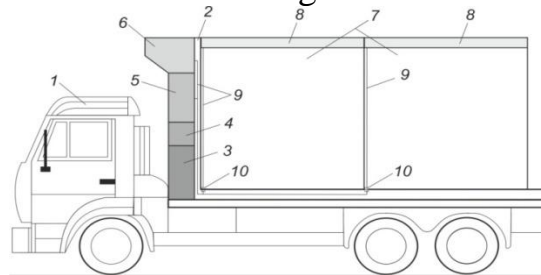


Figure 1 – The vehicle for transportation of refrigerated cargo

Work of the vehicle for transportation of refrigerated cargoes is carried out in the following way: on the cargo vehicle 1 the frame 2 in which are established the power supply 3, the control unit 4, the compressor 5 and the condenser 6 is mounted. Cargo containers 7 are mounted on the frame of the evaporator 8. The evaporator connects to the compressor and the condenser through conduits 9, which are nodes of the connector 10. The compressor pumps the refrigerant from the evaporator and pumps it to the condenser. In the condenser refrigerant is cooled

and condensed and falls through the pipes to the evaporators, which carry out the necessary cooling of cargo containers. The whole process of cooling of cargo containers is regulated by the control unit and the power supply is a power source. The cargo container can be loaded with perishable products that require cooling during transportation. Cargo container mounted in a standard method by means of the fittings installed on the locks (not shown) which are mounted on the frame. Cargo container quickly unload at the fittings, and can be loaded with new containers of the same size.

As a result of improving the vehicle for transportation of refrigerated cargo the patent application of the Republic of Kazakhstan is submitted [2]. For higher precision of determination of rational design data, detailed researches with development of digital model in the program environment of the SolidWorks or ANSYS application programs are necessary.

Thus, this development allows to increase mobility and operational opportunities of the vehicle for transportation of refrigerated cargoes.

References

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