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СБОРНИК МАТЕРИАЛОВ IX МЕЖДУНАРОДНОЙ НАУЧНО – ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ: «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ТРАНСПОРТА И ЭНЕРГЕТИКИ: ПУТИ ИХ ИННОВАЦИОННОГО РЕШЕНИЯ»

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Тематика статей и докладов участников конференции посвящена актуальным вопросам организации перевозок, движения и эксплуатации транспорта, стандартизации, метрологии и сертификации, транспорту, транспортной техники и технологии, теплоэнергетики и электроэнергетики.

Материалы конференции дают отражение научной деятельности ведущих ученых дальнего, ближнего зарубежья, Республики Казахстан и могут быть полезными для докторантов, магистрантов и студентов.

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IMPROVING THE TOWING CHARACTERISTICS OF AERODROMIC TOW TRUCKS

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In connection with the intensive development of the aviation industry, the introduction of new generations of aircraft (AC), the reconstruction and construction of airfields, ground-based aviation special equipment is widely used.

At the same time, the issues of efficiency and economy during the operation of structures of aeronautical ground equipment are currently insufficiently studied. Tow trucks in the airfield area perform a wide range of traction operations, including work with attachments and as aircraft towing vehicles. The use of tow trucks for aircraft towing significantly increases the above indicators of aviation technology. When towing an aircraft, airfield tow trucks use the traction force generated by the wheeled propeller. To increase the tractive effort developed by the truck, especially in the winter period of operation, additional ballast is used, which leads to a sharp increase in operating costs associated with an increase in fuel consumption and depreciation wear of the truck units and assemblies.

The purpose of this research is to improve the traction qualities of airfield tow trucks-towing aircraft in terms of adhesion to the supporting surface due to the traction coupling reloading device (TCRD), due to a significant deterioration in the frictional qualities of the airfield pavement depending on weather conditions, as well as to increase the efficiency of these means.

The basis for the development of the principle of operation and the design of the hydraulic traction coupling reloading device is based on the following requirements:

-the towing-coupling reloading device should not only carry out mechanical docking of the towing vehicle with the front strut of the aircraft, but also ensure an increase in the towing weight of the truck within the widest possible range;

-Increase the coupling weight of the truck must not go due to the increase of its structural weight, as this will cause a reduction in transport soon - stay and an increase in operating costs;

-the coupling device must have a remote hydraulic control, as simple as possible, ensuring its installation on serial trucks.

Because of the reduced requirements basis of the principle of operation of the coupling device was put redistribution reactions normal-bearing surface of the towing due to partial or complete posting - front aircraft mechanism via the trailer coupling device reloaded.

The proposed method of increasing the weight of the truck coupling based on a landing gears Implemented in a number of designs of coupling devices, one of which received a positive decision on granting patent. In Figure 1 shows a general view of the back of a truck, equipped with a towing device.

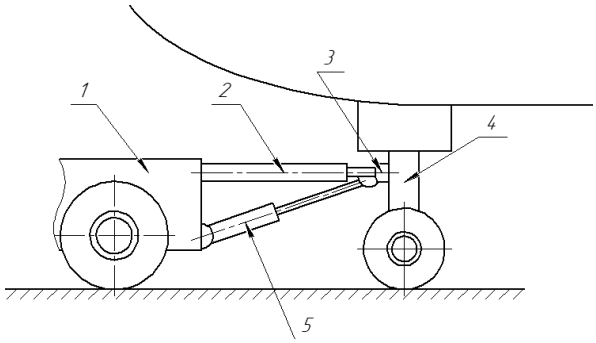

Figure 1

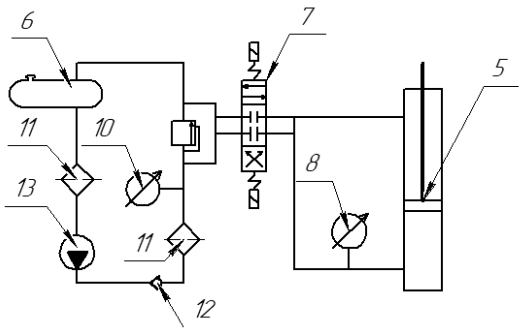

Figure 2

Towing reloaded device includes the following elements: truck **1**, on the rear side of which is pivotally secured a carrier frame **2** have - present at the end of forked grip **3** , which interacts with the front pillar **4** of the aircraft landing gear. Bottom between the plug gripping and abutment on the truck is mounted a hydraulic actuator **5** having drive from hydraulic pump **13** , which in turn submits the hydraulic fluid from the tank **6** through filters **11** , check valve **12** to a three-position solenoid spool valve **7** , via which is controlled from the driver's cab cylinder **5** when lifting and lowering the carrier **2**.

The device works as follows:

Before towing, the towing truck approaches the aircraft and, by means of gripper **3,** is connected to the front landing gear pillar **4**. Then driven hydraulic pump **13** supplying high pressure, whose magnitude is determined by the pressure gauge **10** , the hydraulic fluid from the tank **6** through the filters **11** and check valve **12** to the three-position electromagnetic spool distributor **7** , through which is carried a hydraulic power cylinder control with lifting and lowering the carrier. Further, regulation reloaded efforts made by means of a pressure regulator, also performs the function of a safety valve. Control of the amount of reloaded efforts carried out by the manometer **8.** The hydraulic cylinder is located at the working pressure constant, during the entire time, optionally - go to work with increased towing coupling weight. Thereby achieving the additional loading of the driving wheels of the truck, which allows increasing the traction force of the truck linkage and reducing wheel spin, which is particularly needed - directly into the autumn-winter period when towing on wet and snow-covered surfaces. Proposed reloaded device 2.86 times lighter and 7.5 times shorter than the pay, and for its maintenance requires three times less personnel. The described coupling allows solving the main problem of ensuring operation Tow truck for towing aircrafts with more weight of airfield coating with a low coefficient of adhesion - the problem of increasing the adhesion weight of the truck without increasing its structural weight.

Since modern tow trucks' reserve power is not realized, and there is a tendency to further increase the unit capacity of the wheeled trucks on the - values, the increase in weight allows their coupling Solve the problem of increasing traction qualities when towing.

Structure towing reloaded device allows adjustable reloading wheel propulsion truck partial mass plane falling on its front pillar, only at the - initial period of movement to overcome the forces of inertia and the need for towing of the coating with a low coefficient of adhesion.

When the theoretical investigators made an analysis of towing qualities of the airfield tow truck on different support surfaces, traction characteristics allow in graphic form to establish the dependence of the traction of the important indicators of the towing, as slippage of wheel propulsion, the actual velocity, traction power, hourly and specific fuel consumption, etc.

The snow-bearing surface has a high value to - coefficient of rolling resistance and relatively low coefficients - that clutch. Without additional load truck towing on snow-covered surface, developing a thrust of 12 kN at $\delta \approx 20\%$. The traction power is 55 kW. Increasing the weight of the truck hitch due to work of towing device10-30 kN respectively on the way - exists all improve

traction performance, the traction power increases by 18%, the maximum traction force (at δ≈20 %) reaches 17 kN.

Towing characteristics on the wet and dry concrete coating on the first transmission (i_M = 53.48) : without reload truck develops maximum thrust force of 37.5 kN adhesion on wet , and 50.8 kN for dry concrete, and in normal cases (without ballast or additional loading) it stops due to the complete slipping of the propellers. The engine of the truck on wet concrete without additional loading operates only on the regulatory branch of the characteristic. Then, as a dry concrete, it works as regulatory and at deregulatory the molecular branches characteristics.

Wet concrete without additional load at maximum traction power N_T = 6 6kW traction force on bridges distributed equal to K_{1-2} = 1.21. The same index for dry concrete with N_T = 98.2 kW composition - to set up K_{1-2} = 1 05 i.e. to behold bridges towing loaded almost evenly.

An increase in the towing weight of the towing vehicle due to the operation of the towing device by 2500 kg, when towing on wet concrete, increases the maximum traction force to 52.5 kN, while the engine goes to the unregulated branch. The maximum traction power N_t increases to 88.5 kW, which means 34% of all fuel consumption at one and so on the same traction force 25 kN reduced to 2.8%. The total traction force is distributed unevenly across the bridges (K_{1-2} = 0.21%), i.e. bear the brunt bridges balancis truck, and forward bridge develops small traction due to insufficient adhesion weight .

As a result, the positive effect of additional loading of the truck with additional adhesion weight due to the operation of the towing device on increasing the traction force and the unit, increasing its tractive power, reducing the slipping of the propellers, as well as reducing the hourly and specific fuel consumption on all characteristic supporting surfaces was confirmed using the traction characteristics.

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DIFFERENT RAILWAY GAUGE PROBLEM BETWEEN KAZAKHSTAN AND CHINA

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For the connection of trans-continental railway network, it is critical to conquer the break-of-gauge problem at the borders in different countries. Up to now, the best solution seems to be the employ of the auto-changeable gauge equipment. Countries, such as Kazakhstan and China are developing and commercializing auto-changeable gauge equipment to maximize transport efficiency for the trans-continental network. The efforts to search a suitable logistical service are also underway. In this paper, technology and development trend of this equipment in several