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SPRZĘGŁO PNEUMATYCZNE Z ELEMENTEM PODATNYM

Streszczenie: W pracy przedstawiono nowy typ sprzęgła, dla którego złożono zgłoszenie patentowe i udzielono ochrony w postaci zarejestrowanego wzoru użytkowego. Proponowane sprzęgło wykorzystuje nowy typ elementu elastycznego w postaci przewodu nawiniętego między powierzchniami podparcia napędowej i napędzanej tarczy sprzęgła.

Słowa kluczowe: sprzęgło elastyczne, przewód eleastyczny, patent

PNEUMATIC FLEXIBLE SHAFT COUPLING WITH HOSE FLEXIBLE ELEMENT

Summary: Paper presents a new shaft coupling type to which a patent application has been filed and a protection by utility model has been given. Proposed coupling uses a new type of hose-shaped flexible element winding between the supporting surfaces of the coupling's driving and driven hub.

Keywords: flexible shaft coupling, hose flexible element, patent

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1. Introduction

Currently produced, conventional flexible shaft couplings use metal or rubber flexible elements to provide flexible torque transfer. In addition to transmitting torque, they also provide accommodation of radial, axial and angular misalignments of connected shafts, as well as damping torsional shocks and vibrations. An important parameter of flexible shaft couplings incorporated in mechanical systems with periodically alternating torque is their dynamic torsional stiffness because it affects the natural frequency of torsional oscillation of the mechanical drive system [1]. The specific value of dynamic torsional stiffness of shaft couplings with metal and rubber flexible elements during operation results from both the applied flexible elements and operating parameters such as: mean torque, frequency and amplitude of harmonic torque components, elastic element temperature etc.
For tuning the mechanical system in terms of torsional vibration, it is necessary to select a flexible shaft coupling with a suitable dynamic torsional stiffness (taking into account the mentioned effects of operating parameters too), which can no longer be changed by ourselves. But the mechanical parameters of these couplings are constantly changing also due to aging and wear of their flexible elements, which can cause that the system will be no more properly tuned [1,3].
The disadvantages of the above-mentioned flexible shaft couplings can be eliminated by using pneumatic flexible elements (air-springs) in which the flexible transmission of the torque is ensured by compressed gaseous medium [2, 3]. The pressure of the gaseous medium in these flexible elements can be adjusted. This makes it possible to suitably adapt the dynamic torsional stiffness of the coupling to the actual operating mode of the mechanical system. A further advantage of these pneumatic flexible elements is that the gaseous medium is not subject to aging or wear [3].
This article presents a new type of pneumatic flexible coupling to which a patent application has recently been filed [4] and a protection by means of a utility model has been given [5].

2. Proposed flexible shaft coupling

Presented coupling uses a new type of pneumatic flexible element for flexible torque transmission. It is a hose-shaped flexible element winding between the supporting surfaces of the coupling's driving and driven hub (Fig. 1).

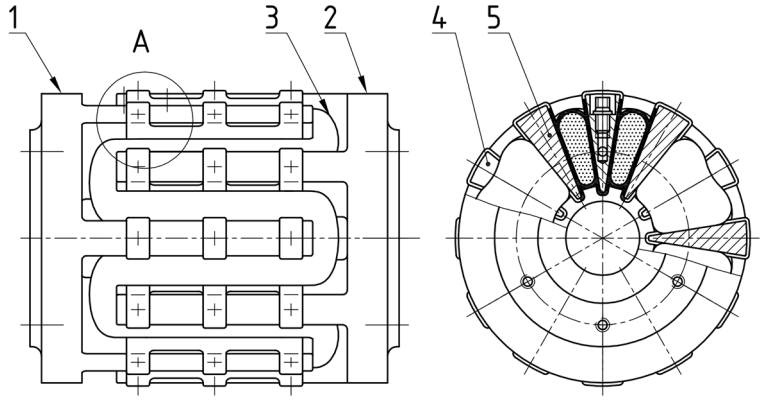

Figure 1. Pneumatic flexible shaft coupling with hose flexible element [4 - 5]

Proposed pneumatic flexible shaft coupling with hose flexible element (Fig. 1, Fig. 2) consist of a driving *(1)* and a driven hub *(2)* flexibly connected via hose pneumatic flexible element *(3)*.The hose flexible element winds between the support surfaces of driving *(4)* and driven *(5)* hub. Compressed gaseous medium is fed into the compression space of the coupling via a pneumatic plug *(6)* which is secured in the opening of the support surface by an adjusting screw *(7)*. The sealing of the pneumatic plug is solved by sealing rings *(8)*. Compressed gaseous medium is fed into the compression space of the coupling via a filling valve *(9)*. The pneumatic hose element is fixed to the support surfaces with screws *(10)* and washers *(11)*.

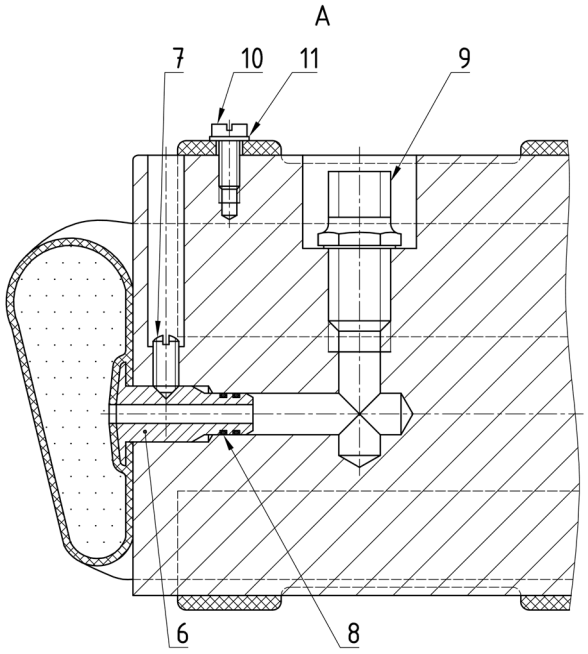

Figure 2. Pneumatic flexible shaft coupling with hose flexible element detail of the pneumatic plug connection [4 - 5]

Due to the relative rotation of the hubs from the neutral position, the compression volume of the hose flexible element is compressed, thereby ensuring a flexible transmission of torque between the driving and driven hubs. The advantage of this hose flexible element is that the compression volume of the entire pneumatic coupling has to be sealed only at the location of the pneumatic plug and the filling valve ensuring the supply of compressed gaseous medium. Furthermore, the design of the hose flexible element allows quick and easy assembly and dismantling, if necessary.

Conclusion

Pneumatic flexible shaft coupling with hose flexible element can be applied in systems of mechanical drives. It allows flexible torque transmission, and thanks to the ability to change its torsional stiffness, ensures the tuning of these systems in various operating conditions. Moreover, the design of the hose flexible element ensures a reliable sealing of the compression volume and it is easy to assembly or disassembly. Pneumatic flexible shaft coupling with hose flexible element will therefore increase the technical level and reliability of the mechanical systems in which it will be applied.

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VEGA 1/0473/17: *„Research and development of technology for homogeneous charge self-ignition using compression in order to increase engine efficiency and to reduce vehicle emissions"*.

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