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## **Sound dampening of onboard equipment**

*It analyzes the work Noise reduction enclosure based on passive methods of struggle with penetrating acoustic radiation the operational mode of the flight product. The efficiency of the slotted screen to create a comfortable environment in the control unit of the device. The technical solution has significant novelty and patented in Ukraine.*

It refers to Mechanical engineering, namely, to accommodations for noise isolation, and can be used in aviation and rocket-cosmic techniques for protection of facilities, pressure cells and biological objects from noise of high power. There is a noise-protective screen (NPS) that includes a body with sound absorbing and connective materials, allocated layer wise. The NPS also includes different kinds of non-air cases, lines of which cross each other (see, e.g., c.c. USSR № 1578742, G 10 K 11/00, 1990).

The drawback of this NPS consists in a structural complexity that is stipulated, by the ingress of a big amount of different materials and non-air cases in it.

Besides this, the availability of crossings between non-air cases decreases the acoustic protection efficiency.

There is also a well-known NPC, which includes a rigid body of glass, put on the protected object, a cylindrical screen, which is allocated with an air gap from outside the body, as well as a thickening washer [1].

There is also known the NPS that includes a total body and a hermetic casing in the shape of, gathered without an air gap, endwise, hollow hoops, from the cavity of which the air is removed. The casing is allocated outside the body, and it also contacts with the body (see, the Ukraine patent № 2002031935 from 11.04.2002 application to invention, positive decision from № 2002031935 from 11.04.2002 year).

This NPS is the most appropriate to the invention, because of its technical essence and attainable effect.

The drawback of this NPS consists in its deficient sound resistance, in the issue, the non-air cavity of casing, incompletely, overlaps its sidewalls. The other reason of the reduced sound resistance is that the casing in altitude and diameter contacts with the body. Consequently the casing conveys a meaning part of sound energy to the protected object (similar to the sound weak link).

The task is to improve the NPS. In this NPS, by changing the form, allocation and fastening of the casing, the total overlapping of casing walls, by non-air cavity is secured, and the almost total casing exclusion from the contact with

body is obtained . This will, considerably, raise the sound resistance, and will increase the acoustic protection efficiency.

The assigned task can be solved, taking in consideration, that the NPS contains a total body of glass shape, and the hermetic casing, where the air is removed, allocated outside the body. The casing is made in the form of the glass, installed, on the body with an air gap; the opened end of the glass is hermetically attached to the body.

The realization of non-air casing in the form of installed on the body glass with an air gap, where the opened end of the glass is hermetically attached to the body, secures its walls total overlapping, by non-air cavity, and excludes their altitude contact with body and the glass bottom. This leads to the growth of the sound resistance. In the issue, the acoustic protection efficiency raises.

The NPS is introduced on the fig.1.6, the general form.

The NPS includes the total body 1 of glass shape with flanged collar 2, and also the hermetic casing 3, allocated outside the body. The casing 3 is made in the shape of the glass 5, installed on the body 1 with the air gap 4. The opened end 6 of the glass 5 is hermetically attached, for example, soldered to the body 1. From the cavity 7 of the casing 3, which it forms with the outside surface of the body 1, in the ranges of the air gap 4, the air is removed.

When in use, the NPS is installed on the protected object 8, for example, gyroscopic facility, and is fastened on its basis 9.

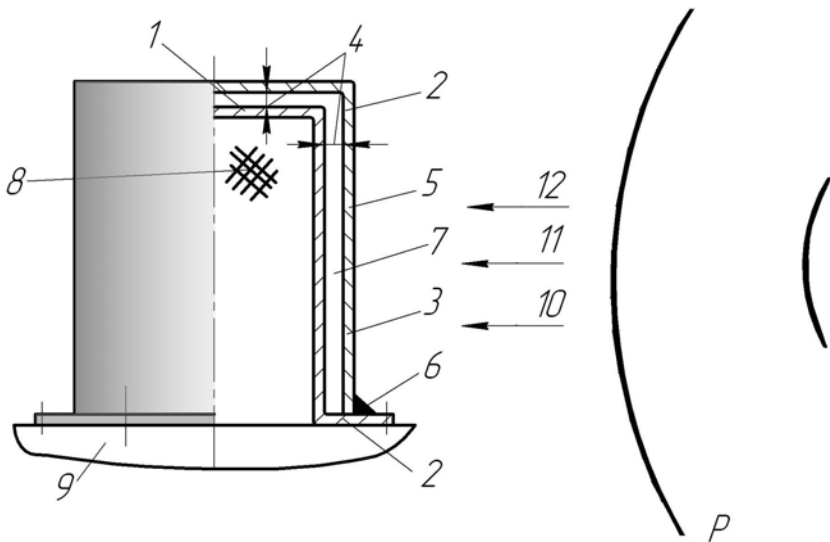


Figure 1. Damper device

The principle of the NPS operation is following.

When the intensive sound P field influences the NPS sound waves, for example, the waves 10, 11, 12, when reaching the casing 3, they partially penetrate through its surface and dissipate in the environment through the casing wall, and sharply brakes, by the non-air cavity 7. In the non-air cavity there is a lack of any substance, which the sound waves could convey. The casing walls and the body don't possess a direct contact between each other (without mentioning the minor contact in the position of casing joint with the body, the area of which is within some percents of inside surface casing area). When braking the sound waves, by non-air cavity 7, their energy intensively dissipates in the walls of the casing 3 at the expense of internal friction and they don't reach the protected object 8.

Owing to that fact that non-air cavity 7 completely overlaps the cylindrical and plain casing 3 sidewalls (vice of a partially overlapping), and the casing contacts with the body only in a limited zone of its binding with (instead of contact along the whole surface), and the sound resistance of the NPS will considerably increase. Therefore the acoustic protection efficiency will increase [2].

Such NPS can be used for protection from aerodynamic noise of gyroscopes and pressure cells in hydro regulating platforms, and integrators of lengthwise accelerations of rockets in aerospace complexes of multiple using, heavy planes, for the protection of biological objects, etc.

### **Conclusions**

According to modern technologies, the movement speed of aircraft constantly grows, and accordingly, the need for sound insulation of on-board equipment. Thus, passive acoustic techniques are quite effective and in demand on the aircraft. Slit screen has the feature that is used in the process of sound proofing it uses bulk nonlinearity of the resonant level.

### **References**

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