

SIMPLE SOLUTIONS FOR CONTROLLING THE QUALITY OF INFILTRATED AIR THROUGH THE EXTERIOR JOINERY ELEMENTS IN CASE OF CALAMITIES

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ABSTRACT

Considering the more frequently events (volcanic eruptions, explosions, chemical contaminations etc.) which occur in nature, villages and industrial towns, the paper presents simple solutions and mechanical devices that allow the use of aeration function within habitable places for life protection and human health.

These devices were the objective of some research studies that led to the determination of air amount needed for performing the activity under normal conditions in diverse habitable places (kitchens, living-rooms, bed-rooms or places with special destination in accordance with the imposed hygienic norms) and the determination of their constructive and functional features, implicitly.

Experimental models devices for adjusting the aeration function in three constructive variants (with valve closure, with sliding cylinder element) were elaborated based on the performed studies and research. Based on the research studies performed by the author in Romania, EU countries and other areas, it is noticed that a small number of habitable places are endowed with such simple but efficient devices used for controlling the aeration function in case of calamities.

These devices can be mounted in subassemblies of windows or in mixed elements; the production costs are reduced. The constructive systems, under normal exploitation conditions, allow the aeration/ventilation of habitable spaces ensuring the protection against insects as well. In case of calamities the slop panels can be equipped with special filters for air purification; these can be fixed without a special training. The proposed solutions may represent an alternative to the classical solutions for air conditioning that request high costs and available power source.

Keywords: *devices, windows, solutions.*

1. INTRODUCTION

Intense competitiveness among producers, both local and global, led to a significant rise in quality importance, for products and services as well. The correct identification of the consumers' necessities and their satisfaction before, during and after the sale (whatever the type and the characteristics of the product or of the service might be) are considered key competitive advantages.

There has been recently laid a great stress on the ratio quality-price and on the characteristics of the products and services leading to a better protection of the environment in general and of the habitable places in particular. In order to obtain these competitive advantages, more and more organizations began to be interested in implementing environment and quality management systems, in a continuous attempt to improve the quality of the products and of the services they offer.

Beside these aspects concerning quality, to maintain oneself on the market supposes permanently offering new products with characteristics that allow solving major challenges under the conditions of the variegated changes having occurred in nature and in the habitable places.

2. CURRENT CONJECTURE AS REGARDS ENVIRONMENT

More and more voices claim that there have been lately producing important changes concerning climate and respectively modifications of the ecosystems. Very many measurements exist, which tend to support the veracity of these phenomena and nonetheless the opinions are not homogeneous. One thing is sure and the proofs are incontestable, that on zonal level very many calamities influence the environment and the life of the inhabitants from these geographical areas. Among these calamities, mention may be made of earthquakes, floods, volcanic eruptions, devastating storms, explosions within industrial environments etc. All these bring about phenomena that influence people's life, whatsoever the specific of the habitable places, as long as they are not protected with specific systems. In the developed countries there are high performance systems of protection and for reconditioning the air, and they are in an expansion process, following the globalization of the markets. The issue of intensely using these installations is reduced in the case of the countries with small earning per inhabitant, in covering the costs concerning the investments and their maintenance in exploitation. There is known that these systems are in many cases energy-intensive and their functioning supposes the utilization of electrical energy produced, in happy cases, within installations using alternative, ecological sources. There is also known that in the countries throughout Eastern Europe, respectively also in Romania, the penetration on the market of high performance joinery systems, especially as regards the sealing-off of the habitable and social cultural places led to no improvement of the environment conditions within these spaces.

There are currently being made different measurements for determining the concentrations of the existing polluting substances evacuated in the atmosphere by natural and artificial factors (sources). The evaluation of the atmospheric air quality, through determining the concentration of the polluting substances in the environment may be done through mathematic modeling techniques. The dispersion of the polluting substances in the environment mainly produces itself because of the convective motions and consequently of the air current induced because of the thermal gradient. The atmospheric dispersion depends at the same time on many other factors, such as: wind, height of the thermal reversal stratum, height of polluting substance giving off in the atmosphere, temperatures of the emission and of the environment, characteristics of the air (viscosity), relief of the terrain and its rugosity (urban, agricultural area), solarization and differences between night and day. The kinetics of the relation of the reactions is characteristic and specific for every polluting substance in part.

3. SUBMITTED SIMPLE SOLUTIONS

So as to comply with this multitude of physical factors (proceeding from nature, from industrial environments), simple and at the same time economical technical solutions are submitted, which should answer the current tendencies of the potential beneficiaries' income diminution, in the specific context of an economic crisis.

These solutions refer to manually adjustable airing devices, resorting to different solutions, for instance the submitted ones: with valve, with concentric cylinders, with sliding element. All these devices are based on simple technical solutions, may be realized at low costs, are extremely reliable and raise no problems during exploitation; the aesthetics likewise very well fits the product they are set up upon: windows, doors, different construction elements situated at the separation surface between two environments (usually interior-exterior).

The devices also solve the airing function problem of the habitable and social cultural places which were equipped with air-proof joinery systems, without considering that very many among them did not possess ventilation channels through the construction structural elements or that they were obstructed or deteriorated in time (for instance part of the constructions in the Eastern countries).

These simple airing systems are made up of sub-assemblies that allow, through their translation or rotation, the closing in different positions of several slots, generating greater or smaller surfaces of contact with the external environment. The slot opening is protected in the current exploitation manner by protection netting against insects, a fact which allows their utilization in open position along relatively high time durations (holidays), without breach of close, maintaining a comfortable climate in the served habitable places. Under conditions of calamity, the current air access slots are submitted to be equipped with filters, which may be set up by the beneficiaries until the passage of the maximal intensity period of the perturbing phenomenon.

There may be further added that the slots of these devices were dimensioned on the basis of mathematical calculations and afterwards experimentally verified under laboratory conditions for different dynamic pressures equivalent to the wind speed, with values ranging between (0-1000)Pa; they proving their functionality also for values of 10 Pa, the air quantities being considered 7,5 m³ per hour. The necessary quantities imposed by the hygiene norms within a room, depending on its destination, may be optimized through setting up one or several devices Fig.1. Other details referring to the measurements, to the aspects mentioned above made the object of other works and the author may offer supplementary explanations. At present time, the works have evolved from the project stage to experimental models submitted and used within certain habitable spaces.



Figure 1. Possibilities of setting up the adjustable devices

3.1. Airing devices with concentric cylinders

They may be executed out of different bad-weather-proof materials. The functioning principle consists in driving one of the two concentric cylinders, so that through superposing they might augment or diminish an air admission slot (opening) according to the necessities. Such a constructive system is presented in Fig.2.



Figure 2. Airing device with concentric cylinders

3.2. Airing devices with valve

They differ through the constructive element from the ones with concentric cylinders. The air admission slot (opening) is adjusted through modifying the position of a valve. The valve adjustment is executed through driving a button placed at one of the extremities of the device, according to Fig. 3.

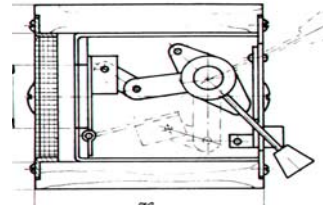
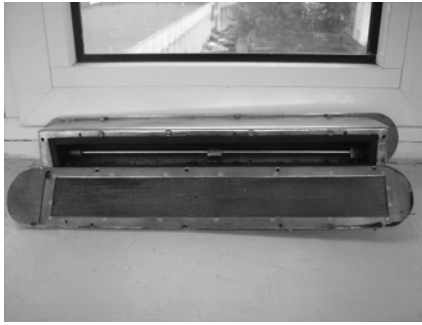


Figure 3. Airing device with valve

3.3. Airing devices with sliding element

In correlation with its denomination, the air access slot opening is adjusted through the simple sliding of an obstructing element. It is an extremely simple and efficient device. It is presented in Fig. 4.

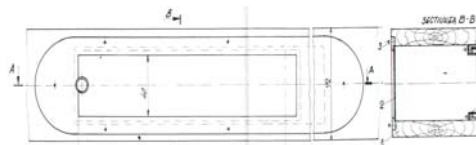


Figure 4. Airing device with sliding element

4. CONCLUSIONS

The submitted airing devices are proposed as simple alternatives for solving the airing problems in case the beneficiaries' financial possibilities are reduced; prevention being however necessary in the case of calamities which may be anticipated (areas with high risk factor and periods with high noxious emissions). These devices may be set up in the sub-assemblies of the joinery systems or in their connective elements within new constructions, in case of repairs for old constructions, or any time the airing improvement is deemed necessary. For short periods, there may be resorted to auxiliary endowments with filters for noxious emissions caused by calamities; through supplementary endowments with fans, the periods may be extended and in the case of exploitation under normal conditions with open slots, they ensure achieving comfortable environment conditions for the served spaces.

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