

INNOVATIVE SOLUTIONS ON ACTIVE-ENERGY WALLS

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ABSTRACT

Here are reviewed Active-energy walls with patents pending.

In result of these solutions, solar energy could be directly used for air heating of the premises in a building with the help of pipeline, situated in the external walls, made of panels or situated in the floor construction. Temperature comfort is maintained by the uniform radiation, coming from the external walls and the floor construction.

Keywords: innovative solutions, active-energy walls, patents.

INTRODUCTION

An outer covering of the building, made as an active-energy structure should become an ordinary occurrence in geographic regions with intense solar shining. The highly effective insulation of this covering allows to avoid the overheating of the internal premises during the summer. The active-energy structures could be used as elements of water and aerial heating systems as well as systems for hot water-supply. "Solar houses" could be built as:

- a) Active-energy walls with hanged water collectors;
- b) Active-energy walls with free mountable and dismountable structure layers, having an integrated tubular pipeline of a water collector between them.;
- c) Active-energy under-roof spaces, where are situated the water collectors and accumulators.

1) ACTIVE-ENERGY WALLS WITH HANGED WATER COLLECTORS (FIG.1.)

On the south walls are hanged water collectors, connected with water

accumulators, situated in the under-roof space. The water collectors are situated under a transparent covering, which protects them against wind. The warm air, obtained with the help of the hothouse effect could be passed through openings if necessary directly to the premises of the first and second floors.

2) ACTIVE-ENERGY WALLS WITH FREE MOUNTABLE AND DISMOUNTABLE STRUCTURE LAYERS, HAVING AN INTEGRATED TUBULAR PIPELINE OF A WATER COLLECTOR BETWEEN THEM.

- Implementation for direct aerial heating of the premises, using a tubular pipeline, integrated into the inner walls.

The tubular pipeline installation for solar heating, integrated into the outer façade is an opportunity to obtain heat to be used for direct heating of the premises, enclosed by these walls. The south, east and west walls could be used in the solar heating cycle only if they are well insulated. The real thermal strength of the enclosing walls is higher or at least equals to the normal thermal

strength for the respective geographic region. Indeed, each one of the three facades has the role of a wide-surface water collector. Thus,

the implementation of solar energy allows not only the solar heating, but to obtain hot water as well.



Fig. 1. Solar houses. Knauf competition. [2]

Exemplary solution. Patent № 63348 B 1. (Fig. 2 and 3.)

This invention will find application in the building of outer walls for different types of buildings. It accumulates and implements the solar energy. The wall panel includes a tubular system that consists of two independent circles, situated respectively along the internal and external panel outline. Each side of the element consists of a U-element (4,6), situated symmetrically opposite another U-element (4a,6a) and a medium energy-accumulating nucleus (8), connected with the U-elements (4 and 4a) and (6 and 6a) with the help of a tooth and a groove. Opposite the teeth (12) of the outer

U-elements (4 and 6) and in the respective grooves (8) are inserted vertical energy-supplying tubes (9), which at their first end are connected with vertical energy-absorbing tubes (13), situated in front of the outer panel surface. In front of the teeth (12a) of the inner U-element (4a and 6a) and in the respective grooves of the nucleus (8) are integrated vertical energy-using tubes (9a), which are connected at their first end with vertical energy-radiating tubes (13a), situated in front of the inner panel surface. At the other end the tubes (13) and the vertical energy-supplying tubes (9) are connected respectively with a first outer (15)

and a second medium (16) horizontal tubes, coming out of the panel.

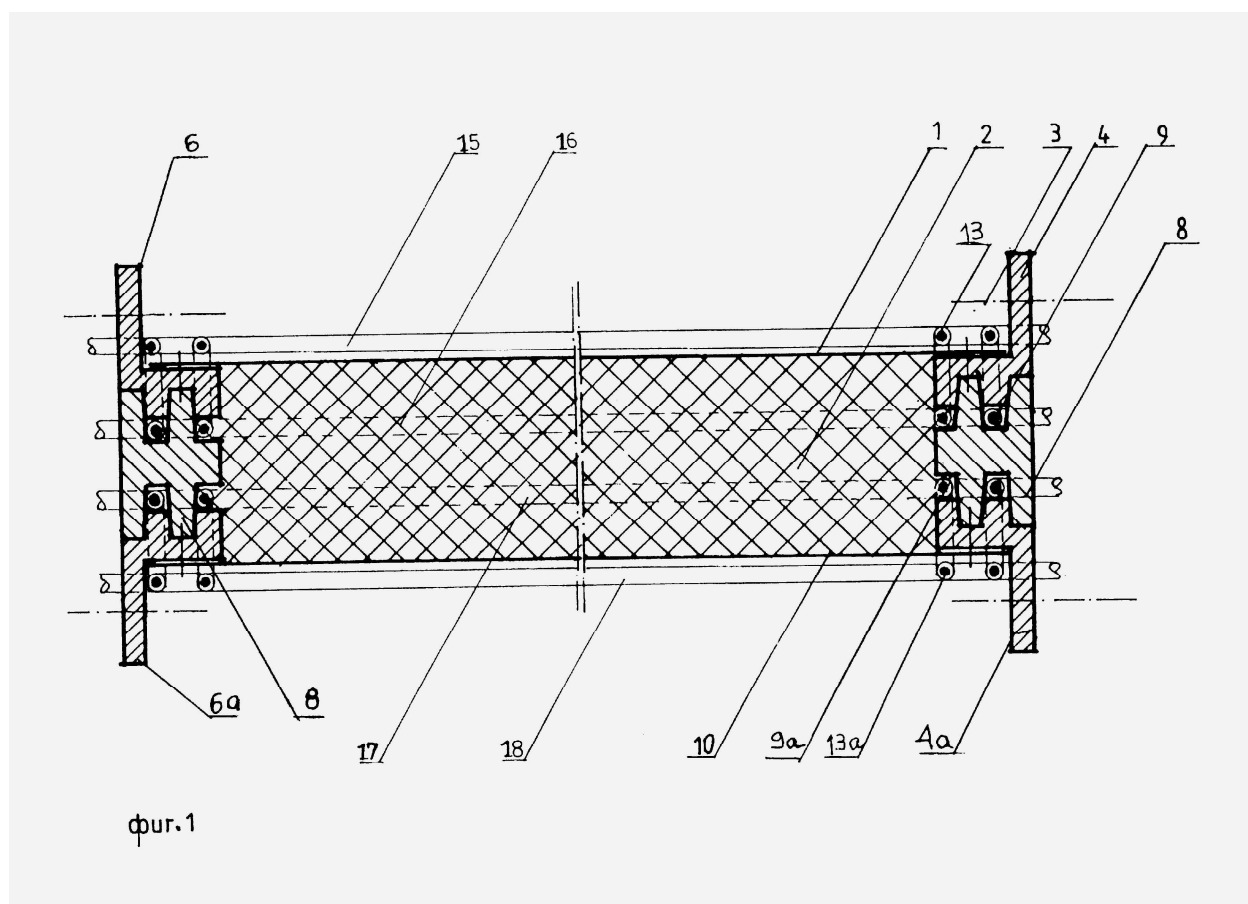


Fig.2. Patent № 63348 B1. Horizontal section (fig.1 of the patent). [1]

Description of the positions on fig.2:

1- surface layers, 2- insulation , 3- screws, 4- outer U-element, 4a- inner U-element, 6- outer U-element, 6a- inner U-element, 8- medium energy-accumulating nucleus, 9- vertical supply-tubes, 9a- vertical use-tubes , 10- inner surface layer of the left panel, 11- energy-accumulating covering, 12- teeth, 13- vertical energy-accumulating tubes, 13a- vertical energy-radiating tubes, 14- outer semi-cylinder transparent covering , 14a- inner semi-cylinder transparent covering, 15- first outer horizontal tube, 16- second medium horizontal tube, 17- third medium horizontal tube, 18- fourth outer horizontal tube.

The tubes (13a) and the vertical energy-using tubes (9a) are connected respectively with a third medium (17) and a fourth outer (18) horizontal tubes, coming out of the panel.

The energy-supplying tubes (9) and the energy-using tubes (9a) are covered through all their length with an energy-

accumulating covering (11). Between the joints of the adjacent panels is situated a gasket (5) and the vertical gap is double closed by an outer (14) and an inner (14a) semi-cylinder transparent covering, protecting respectively the energy-absorbing (13) and the energy-radiating (13a) tubes.

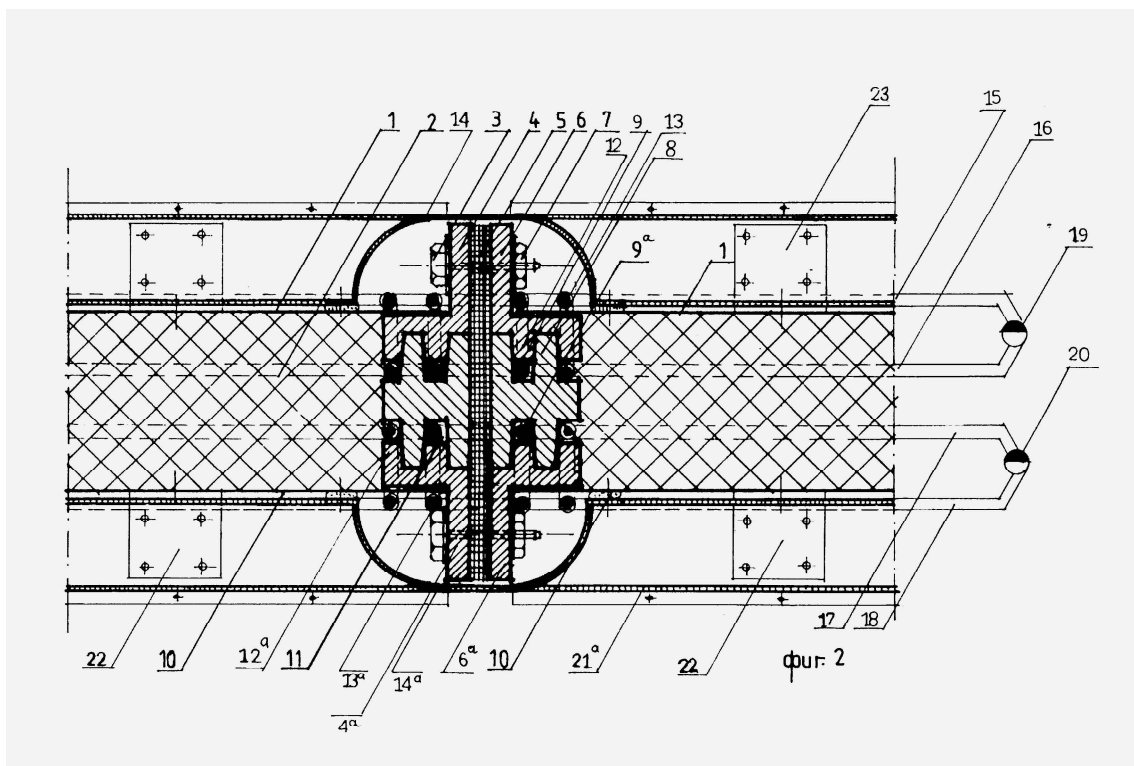


Fig. 3. Patent № 63348 B 1. Horizontal section through the panel (fig. 2 of the patent). [1]

Description of the positions on fig.3.

1- surface layers, 2- insulation , 3- screws, 4- outer U-element, 4a- inner U-element, 5- gasket, 6- outer U-element, 6a- inner U-element, 8- medium energy-accumulating nucleus, 9- vertical energy-supplying tubes, 9a- vertical energy-using tubes, 10- inner surface layer of the left panel, 10a – inner surface layer of the right panel, 11- energy-accumulating covering, 12-teeth, 13- vertical energy-absorbing tubes, 13a- vertical energy-radiating tubes, 14- outer semi-cylinder transparent covering, 14a- inner semi-cylinder transparent covering, 15-first outer horizontal tube, 16- second medium horizontal tube, 17- third medium horizontal tube, 18- fourth outer horizontal tube, 19 and 20- circulative pumps, 20- outer protruding transparent lines, 21a- inner protruding transparent lines, 22 u 23- angle profiles with oval edge, 24- closing insulating lines, 25- angle profiles.

The horizontal pipes (15,16,17 and 18), coming out of the adjacent panels, are connected with the help of nipples. The heating substance in the tubes (15,16) is set in motion with the help of a circulative pump (19), in the tubes (17,18) the heating

substance is set in motion by another circulative pump (20). The upper and lower horizontal joints of the panel are formed with the help of closing insulating lines (24), stabilized to the floor with the help of angle profiles (25).

3) ACTIVE-ENERGY UNDER-ROOF SPACES, WHERE ARE SITUATED THE WATER COLLECTORS AND ACCUMULATORS. (Fig.4.)

When the under-roof space is well insulated, it could be used for the situation of water collectors and accumulators, containing water for home use.

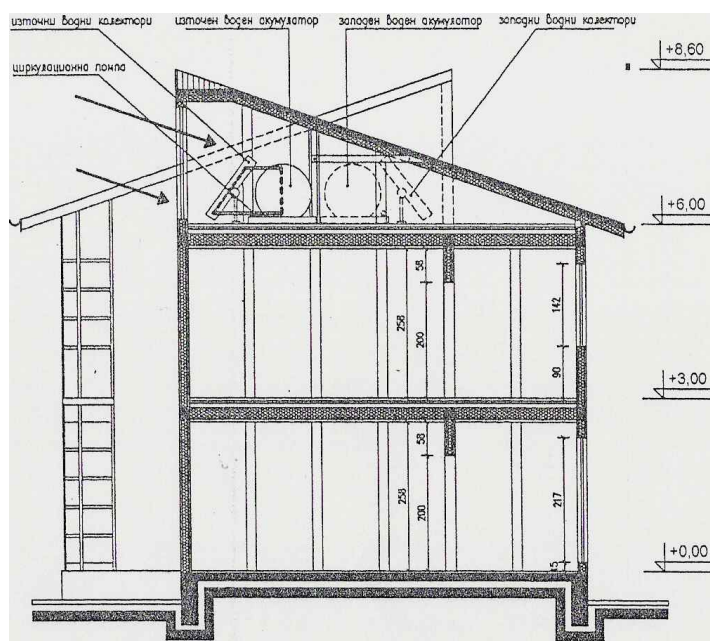


Fig. 4. Solar houses. Knauf competition. Vertical section. [2]

CONCLUSION

- The innovative solutions of the active-energy walls allow to facilitate the heating and hot water-supply in buildings.
- When designing contemporary buildings it is suitable to make an obligatory research

for the possibility of transformation of the walls into energy-active structures.

- Not only the walls but also the under-roof spaces of buildings could be implemented for active-energy implementation if an highly efficient insulation of the roof is ensured.

REFERENCES

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