

ENERGY-SAVING METHOD BY USING WINDOWS AND ENERGY-SAVING WINDOW

Technical Field

The present invention relates to an energy-saving product for buildings, in particular to an energy saving method by using windows and an energy-saving window.

Background of the Invention

As the global economy develops rapidly at present and the demand for energy increases dramatically, the world is facing an energy crisis. However, with the fast development of economy, the building industry has a vigorous development. As the building energy consumption accounts for a large part of the social energy consumption, energy saving and emission reduction have become one of the most important topics nowadays. Green energy-saving buildings have attracted great attention from the society of all levels. The developed countries have introduced zero-carbon houses successively in Shanghai World Expo. It is thus clear that the building energy saving has begun. In the green energy-saving buildings, the utilization of passive solar energy is a critical aspect. According to different longitudes and latitudes, the sunlight conditions are different; and according to different seasons, both the solar azimuth and the solar altitude change over time during a day. Therefore, the good utilization of sunlight plays a significant role in lightening and warming a room and shadowing and avoiding a room from sunlight exposure. For the green energy-saving buildings, the utilization of solar energy is almost implemented on the walls and windows. Chinese Patent Publication CN2526460Y, filed on Dec. 18, 2002, and entitled "MULTIFUNCTIONAL COMBINED WINDOW CAPABLE OF ARBITRARILY ROTATING, UNIVERSALLY POSITIONING AND SLIDING", disclosed a multifunctional combined window, comprising a fixed window frame, movable window sashes,

an idler roller shaft rack assembly, a main shaft, an idler roller groupware and a universal rotating window post assembly, characterized in that the upper and lower horizontal bars of the window frame are provided with guide rail grooves, and a pull rod shaft sleeve, a positioning sleeve and a beating sleeve are mounted in the edge frame groove at the vertical bar of the window sashes; the main shaft is sleeved into the central hole of a shaft sleeve base and is able to rotate therein, and the main shaft is fixed on the idler roller shaft rack assembly beneath which the idler roller groupware is provided; the idler roller groupware is embedded into the guide rail groove of the window frame and is able to slide and move from left to right so as to drive the window sashes to slide and move from left to right; a bevel gear that is in meshed transmission with the bevel gear of a lifting lock is disposed on the main shaft; and the window sashes are capable of rotating arbitrarily 360 degrees around the main shaft or locked. In this patent, the window sashes are just capable of rotating 360 degrees, universally positioning and sliding, that is, the window sashes may be rotated or positioned due to different directions of wind. However, the solar energy, as green and infinite energy, has not been effectively utilized yet, so that the space of a window can not become a tool for lightening and warming a room and shadowing and avoiding the room from sunlight exposure. Chinese Patent Publication CN101324171A, filed on Dec. 17, 2008, entitled "ENERGY-SAVING VENTILATING WINDOW", disclosed an energy-saving ventilating window, comprising window sashes and a window frame, the window sashes being symmetrically disposed in the window frame, installation holes being disposed on the window frame, vertical shafts being disposed in the middle of the two window sashes, the window sashes and the vertical shaft being fixedly connected to form louver blades, a track wheel being disposed in the crack between the bottoms of the two window sashes, a corresponding sectorial track slot being disposed at the corresponding position of the window frame, the track wheel and the track slot being fixedly connected with the window frame via bolts, drilling holes being disposed on the track wheel and

provided with guard plates in a dislocation way taking the vertical shaft as a center. Although the outdoor natural wind of all directions can be effectively guided into the room to expel afterheat and excess moisture thus to save energy, the energy-saving ventilating window disclosed in this invention has functions of ventilating and shadowing only rather than effectively utilizes sunlight to lighten and warm a room.

Summary of the Invention

An object of the present invention is to provide an energy saving method by using windows, by which the space of a window is turned into an indoor or outdoor space by changing the position of the window main body to further adjust the sunlight coming into a room, to overcome a technical problem that the existing energy-saving windows can not effectively utilize sunlight to lighten and warm a room and shadow and avoid the room from sunlight exposure.

Another object of the present invention is to provide an energy-saving window, which has simple structure and changeable position of the window main body and the window main body of which may be cleaned more easily. Such energy-saving window is particularly applicable to high-rise buildings.

The objects of the present invention are solved by the following technical solutions: an energy saving method by using windows is provided, which adjusts the sunlight coming into a room by changing the position of a window main body, the window main body being extended outside of the wall in winter so that the space of the window illuminated by sunlight is turned into an indoor space for the purpose of lightening and warming, while the window main body being retracted inside of the wall in summer so that the space of the window illuminated by strong sunlight is turned into an outdoor space for the purpose of shadowing and avoiding sunlight exposure.

Compared with an energy saving method by using conventional windows, the most important feature of this energy saving method by using windows disclosed by the present invention is that the space of the window serves as a

temperature adjustor for adjusting the indoor temperature of a room. The window main body is extended outside of the wall in winter so that the space of the window illuminated by low-angled sunlight is turned into an indoor space, air in the space of the window is heated by the sunlight to accelerate the indoor air convection, thus the indoor temperature is raised and the energy consumed by indoor heating is saved; while the window main body is retracted inside of the wall in summer so that the space of the window illuminated by strong sunlight is turned into an outdoor space, air heated by the sunlight in the space of the window is isolated outdoor for the purpose of shadowing and avoiding sunlight exposure, thus the energy consumed by indoor cooling is reduced. The position of the window may be changed to adjust indoor temperature as required all the year round, thus realizing energy saving and emission reduction in real sense.

Preferably, an energy-saving window applying the above energy saving method is provided, comprising a window frame and a window main body. The window frame is provided thereon with vertical shafts or guide rails. The vertical shafts or guide rails are in fixed connection with the window frame while in movable connection with the window main body. The window main body rotates via the vertical shafts or moves via the guide rails to change the position thereof. According to the change of seasons or people's requirements, the space of the window is turned into an indoor or outdoor space thus to increase or reduce the sunlight coming into a room for purpose of lightening and warming or for the purpose of shadowing and avoiding sunlight exposure. The space of the window is turned into an outdoor space in summer so that the sunlight coming into a room is reduced for purpose of shadowing and avoiding sunlight exposure, while the space of the window is turned into an indoor space so that the sunlight coming into a room is increased for purpose of warming and lightening. The changeover of the indoor space and the outdoor space is implemented by sliding or rotating the window main body. When the window main body slides or rotates to the outside of the wall, the space of the

window is turned into the indoor space; and when the window main body slides or rotates to the inside of the wall, the space of the window is turned into the outdoor space.

Preferably, the vertical shafts are located in the middle of the window frame, and the window main body is of an arched structure formed of a polyhedron, with upper and lower end faces of the window main body being rotatably connected with the vertical shafts. The window main body is a polyhedron that may consist of planes or cambers, but the overall shape of the polyhedron is of an arched structure. The upper and lower end faces of the window main body are rotatably connected with the vertical shafts, so that the window main body can be rotated 360 degrees. When in need of lightening, the arched shape of the window main body is turned outward so that the space of the window is rotated into the indoor space; otherwise, the arched window main body is rotated to the outside of the wall so that the space of the window is turned into the outdoor space. Such structure is very advantageous to the cleaning of the window main body. The front and back faces of the window main body may be rotated indoor to be cleaned conveniently and safely. This is particularly important for high-rise buildings.

Preferably, the window main body is trapezoidal. The trapezoidal window main body is a concrete manifestation of the arched structure. As the simplest example of forming an arched structure, the trapezoidal window main body may be manufactured, machined and used most conveniently.

Preferably, the window main body is drum-shaped. Compared with the trapezoidal structure, the drum-shaped structure is slightly complicated. However, the drum-shaped structure is a very good preferred solution as it brings about a beautiful appearance. Of course, other shapes, for example, circular shape, semi-elliptic shape or the like, are also good choices and will not be enumerated here.

Preferably, there are one to six window main bodies. The above window main body of the arched structure may not necessarily be an integral structure.

For different buildings, the size and number of the window main bodies may be varied. Preferably, one to six window main bodies are more convenient for machining, installation and use. Certainly, this is not the only choice. More than 7 window main bodies may also be realized. In some buildings, the profile of a whole building may be used as an integrated window. The integrated window may be applied repeatedly as 6 window main bodies.

Preferably, each of the vertical shafts is of a half-shaft structure fixed on the upper and lower end faces of the window frame and extended outward. Designing each of the vertical shafts into a half-shaft structure is to bring convenience for machining, installation and use and to reduce the cost, particularly when there are multiple groups of vertical shafts. The half-shaft structure can reduce vertical members of a window, so that the window looks clean and beautiful. Certainly, with regard to the safety of high-rise buildings, it is understandable to add vertical shafts. Actually, there are many methods to improve safety.

Preferably, the window main body is of a planar structure, to which the guide rails are vertical. The planar window main body is the simplest structure. The guide rails of the window frame may reach the edge of the outer wall, and may also extend outside the wall. If the guide rails extend outside the wall, the upper, lower, left and right faces of the extended portion of the window frame should be provided with enclosures, for example, embedded with glass or transparent plates. In this way, when in need of lightening, the window main body forms a lightening space together with the extended portion of the window frame when the window main body is pushed to the outside along the guide rails; and when in need of shadowing, the window main body moves to the inside of the wall along the guide rails to turn the space of the window into the outdoor space to achieve the purpose of shadowing and avoiding sunlight exposure. Similarly, there may be one to six planar window main bodies. In this way, each planar window main body may be pushed easily due to light weight, and meanwhile may be cleaned conveniently.

Preferably, the window main body is of a drum-shaped structure. The planar window main body in the middle of the drum-shape is corresponding to the guide rails vertical to the window main body, while the arc window main body on two sides of the drum-shape is fitted with the arc guide rails. In such a structure, the planar window main body may move to the inside and outside of the window frame in parallel, and the arc portions at two ends of the window main body may move along the arc guide rails of the window frame so as to form the space of the window together with the planar portion of the window main body. When in need of lightening, the window main body is moved so that the window is protruded outward for purpose of lightening and warming; otherwise, the window main body is moved to the inside of the wall, so that the space of the window is turned into the outdoor space for purpose of shadowing and avoiding sunlight exposure. Similarly, there are one to six planar window main bodies.

Preferably, the window main body is of a trapezoidal structure. The planar window main body in the middle of the trapezoid is fitted with the guide rails vertical to the window main body. Vertical shafts are provided on the insides of two ends of the window frame, respectively. Two side surfaces of the trapezoidal window main body are hinged with the vertical shafts. For the window main body of such a structure, the space of the window may also be changed as required by moving the planar portion and rotating the inclined portion. Similarly, there are one to six planar window main bodies. In this way, each planar window main body may be pushed easily due to light weight, and may also be cleaned conveniently.

Preferably, a sun shield is provided outside the upper end of the window frame. When in need of sunlight, such a sun shield is adjusted to be transparent so that the window is lightened sufficiently, and protects the window main body from being damaged by falling objects; and when not in need of sunlight, the window main body is adjusted not to be transparent for the purpose of shadowing and avoiding sunlight exposure. Such a sun shield

may be manufactured to be a stretchable structure for convenient use.

Therefore, the energy saving method by using windows and the energy-saving window disclosed by the present invention have the following advantages: first, the energy-saving window is simple in structure, low in cost, and convenient for cleaning; second, by rotating or sliding the window main body, the space of a window is turned into an indoor or outdoor space thus to increase or reduce the sunlight coming into a room, so that the energy-saving window has functions of shadowing and avoiding sunlight exposure and also lightening and warming; and third, as the window main body may be rotated arbitrarily 360 degrees, the angle of the window main body may be adjusted according to the direction of wind, so that the effect of ventilation is better.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of a conventional window with sunlight coming therein in winter;

Fig. 2 is a schematic diagram of a conventional window with sunlight coming therein in summer;

Fig. 3 is a stereogram of an energy-saving window according to the present invention;

Fig. 4 is a schematic diagram of an energy-saving window with sunlight coming therein in winter according to the present invention;

Fig. 5 is a schematic diagram of an energy-saving window with sunlight coming therein in summer according to the present invention;

Fig. 6 is a schematic diagram in winter of a trapezoidal rotating window main body according to the present invention;

Fig. 7 is a schematic diagram in summer of a trapezoidal rotating window main body according to the present invention;

Fig. 8 is a schematic diagram in winter of a drum-shaped rotating window main body according to the present invention;

Fig. 9 is a schematic diagram in summer of a drum-shaped rotating

window main body according to the present invention;

Fig. 10 is a schematic diagram of 4 rotating window main bodies according to the present invention;

Fig. 11 is a schematic diagram in winter of a planar moving window main body according to the present invention;

Fig. 12 is a schematic diagram in summer of a planar moving window main body according to the present invention;

Fig. 13 is a schematic diagram in winter of another planar moving window main body according to the present invention;

Fig. 14 is a schematic diagram in summer of another planar moving window main body according to the present invention;

Fig. 15 is a schematic diagram in winter of a drum-shaped moving window main body according to the present invention;

Fig. 16 is a schematic diagram in summer of a drum-shaped moving window main body according to the present invention;

Fig. 17 is a schematic diagram in winter of a trapezoidal window main body partially moving and partially rotating according to the present invention;

Fig. 18 is a schematic diagram in summer of a trapezoidal window main body partially moving and partially rotating according to the present invention;

Fig. 19 is a schematic diagram in winter of six rotating window main bodies according to the present invention; and

Fig. 20 is a schematic diagram in summer of six rotating window main bodies according to the present invention.

In the figures:

00-Wall; 10-Window frame; 20-Window main body; 30-Vertical shaft; 40-Guide rail; 50-Sun shield.

Detailed Description of the Invention

The technical solutions of the present invention will be further described as below in details by embodiments with reference to the drawings.

Embodiment 1

As shown in Fig. 3, Fig. 8 and Fig. 9, an energy-saving window is provided. A drum-shaped window frame 10 is mounted on a wall 00. The upper and lower end faces of the window frame 10 are provided with vertical shafts 30, respectively. Upper and lower faces of a transparent trapezoidal window main body 20 are movably connected with the vertical shafts 30. A sun shield 50 is provided outside the upper end of the window frame 10. The sun shield 50 is fitted with the upper end face of the drum-shaped window main body 20 in shape. Three vertical faces of the window main body 20 consist of multiple small transparent windows opened by rotating a single face. The contact surfaces of the small windows and the window main body 20 and the contact surfaces of the window main body 20 and the window frame 10 are provided with seals, respectively. A locking device is provided between the window main body 20 and the window frame 10.

During in service, when in need of sunlight, for example, in winter, the sun shield 50 is adjusted to be transparent, and the window main body 20 is rotated to the outside of the wall 00 to be locked with the window frame 10. Because of a small sunlight incoming angle, the protruded transparent window main body 20 may receive a huge amount of sunlight. The space within the protruded window main body 20 may become an indoor space, that is, the space of the window is turned into an indoor space. Compared Fig. 4 with Fig. 1, the energy-saving window disclosed by the present invention has a lightening area far larger than that of the conventional window and quite good effects of lightening and warming. When not in need of sunlight, for example, in summer, the sun shield 50 is adjusted not to be transparent, and the window main body 20 is rotated to the inside of the wall 00 to be locked with the window frame 10, so that the outside space of the window main body 20 is turned to be an indoor space. Because of a large sunlight incoming angle and strong sunlight and as the sun shield 50 is light-tight, light can not penetrate through the sun shield. Compared Fig. 5 with Fig. 2, by the energy-saving

solution of the present invention, large-angled strong sunlight can not come into the room basically, so that the effects of shadowing and avoiding sunlight exposure are better.

Because the window main body 20 is rotatable, the front and back faces of the window main body 20 may be rotated indoor to be cleaned conveniently and safely. This is particularly important for high-rise buildings.

Taking Ningbo province as example, in summer, the average incoming angle b of sunlight is 60° , the width of the sub shield 50 is 40cm, and the thickness of the wall 00 is 40cm. To make light coming into a room as little as possible, the sunlight just can not come into the room (as shown in Fig. 5) when the height of the window main body 20 is 125cm. Thus, the sunlight coming into a room is reduced to the largest extent. In contrast, sunlight comes into a room more than 60cm when an ordinary window main body with the same size is used (as shown in Fig. 2). While in winter, the average incoming angle a of sunlight in Ningbo province is 40° , the indoor space is increased by rotating the window main body 20, so that sunlight comes into a room 60cm more than the distance of an ordinary window main body (as shown in Fig. 1 and Fig. 4), and the lightening effect is better.

Embodiment 2

As shown in Fig. 6 and Fig. 7, the window main body 20 is of a trapezoidal structure. The other configurations are the same as Embodiment 1 and will be not repeated here.

Embodiment 3

As shown in Fig. 10, an energy-saving window is provided. The window frame 10 consists of four rectangles. Four drum-shaped window main bodies 20 are disposed in the rectangles of the window frame 10, respectively. Each of the window main bodies 20 may be locked with the window frame 10 at any position, so that the angle of each of the window main bodies 20 may be adjusted according to the direction of wind and actual requirements, to be convenient for ventilation. The other configurations are the same as

Embodiment 1 and will be not repeated here.

Embodiment 4

As shown in Fig. 19 and Fig. 20, an energy-saving window is provided. The window frame 10 consists of six rectangles. Six drum-shaped window main bodies 20 are disposed in the rectangles of the window frame 10, respectively. The configurations are the same as Embodiment 3 and will be not repeated here.

Embodiment 5

As shown in Fig. 11 and Fig. 12, an energy-saving window is provided. The window frame 10 embedded on the wall 00 is an annular main body with a U-shaped cross-section. The width of the window frame 10 is the same as the thickness of the wall 00. The inner plane of the window frame 10 is provided with guide rails 40 vertical to the wall 00. The window main body 20 is of a planar structure. The end faces of the window main body 20 are movably connected with the guide rails 40. The window main body 20 consists of multiple small transparent windows opened by rotating a single face. The contact surfaces of the small windows and the window main body 20 and the contact surfaces of the window main body 20 and the window frame 10 are provided with seals, respectively. A locking device is provided between the window main body 20 and the window frame 10.

During in service, when in need of sunlight, for example, in winter, the window main body 20 is horizontally moved to the outside of the wall 00 to be locked with the window frame 10, so that the space within the window main body 20 forms an indoor space, that is, the space of the window is turned into an indoor space. The energy-saving window disclosed by the present invention has a lightening area far larger that of the conventional window and quite good effects of lightening and warming. When not in need of sunlight, for example, in summer, the window main body 20 is horizontally moved to the inside of the wall 00 to be locked with the window frame 10, so that the outside space of the window main body 20 is turned to be an indoor space. By the solution of the

present invention, strong sunlight coming into the room is far less than that of a conventional window, so that the effects of shadowing and avoiding sunlight exposure are better.

Embodiment 6

As shown in Fig. 13 and Fig. 14, an energy-saving window is provided. The window frame 10 embedded on the wall 00 is an annular main body with a U-shaped cross-section. Three vertical columns are uniformly distributed in the middle of the front and rear openings of the window frame 10, respectively. The upper and lower faces of the window frame 10 are paved with eight groups of guide rails 40 vertical to the wall 00, respectively. A planar window main body 20 consists of four independent portions, each of which may move horizontally along the guide rails 40 independently. The width of the window frame 10 is larger than the thickness of the wall 00. The window frame 10 is extended to the outside of the wall 00. The upper, left and right faces of the extended portion of the window frame 10 may be adjusted to be transparent or not to be transparent. The other configurations are the same as Embodiment 5 and will not be repeated here.

Embodiment 7

As shown in Fig. 15 and Fig. 16, an energy-saving window is provided. The window main body 20 consists of three portions: a planar portion in the middle and two arc portions on two sides. The upper and lower faces of the window frame 10 are provided with arc guide rails 40 and linear guide rails 40, respectively. The window main body 20 is movably connected with the guide rails 50, respectively. The planar portion and the arc portions of the window main body 20 may move along the guide rails 40, respectively.

When in need of sunlight, for example, in winter, the planar portion of the window main body 20 is horizontally moved to the outside of the wall 00 along the linear guide rails 40 to be locked with the window frame 10, and the arc portions of the window main body 20 are moved to the outside end of the window frame 10 along the arc guide rails 40 to be locked, so that the space

within the window main body 20 forms an indoor space, that is, the space of the window is turned into an indoor space. The energy-saving window disclosed by the present invention has a lightening area far larger than that of the conventional window and quite good effects of lightening and warming. When not in need of sunlight, for example, in summer, the planar portion of the window main body 20 is horizontally moved to the inside of the wall 00 along the linear guide rails 40 to be locked with the window frame 10, and the arc portions of the window main body 20 are moved to the inside end of the window frame 10 along the arc guide rails 40 to be locked, so that the outside space of the window main body 20 is turned to be an indoor space. By the solution of the present invention, strong sunlight coming into the room is far less than that of a conventional window, so that the effects of shadowing and avoiding sunlight exposure are better.

Embodiment 8

As shown in Fig. 17 and Fig. 18, an energy-saving window is provided. The window main body 20 consists of three planar portions. The upper and lower faces of the window frame 10 are provided with linear guide rails 40, respectively. The planar portion in the middle of the window main body 20 is slidably connected with the linear guide rails 40. The left and right insides of the window frame 10 are provided with vertical shafts 30, respectively. The planar portions at two ends of the window main body 20 are hinged with the vertical shafts 30.

During in service, when in need of sunlight, for example, in winter, the planar portion in the middle of the window main body 20 is horizontally moved to the outside of the wall 00 along the linear guide rails 40 to be locked with the window frame 10, and the planar portions at two ends of the window main body 20 are rotated to the outside end of the window frame 10 along the vertical shafts 30 to be locked, so that the space within the window main body 20 forms an indoor space, that is, the space of the window is turned into an indoor space. The energy-saving window disclosed by the present invention has a lightening

area far larger than that of the conventional window and quite good effects of lightening and warming. When not in need of sunlight, for example, in summer, the planar portion in the middle of the window main body 20 is horizontally moved to the inside of the wall 00 along the linear guide rails 40 to be locked with the window frame 10, and the planar portions at two ends of the window main body 20 are rotated to the inside end of the window frame 10 along the vertical shafts 30 to be locked, so that the outside space of the window main body 20 is turned to be an indoor space. By the solution of the present invention, strong sunlight coming into the room is far less than that of a conventional window, so that the effects of shadowing and avoiding sunlight exposure are better.

The specific embodiments described herein are just provided for the illustration of the spirit of the present invention. Those skilled in the art may make various modifications, supplements, replacements with similar methods or combinations to the described window frame, window main body, vertical shafts, guide rails, etc., without departing from the spirit of the present invention or going beyond the scope defined by the attached claims.

Claims

1. An energy-saving method by using windows, which adjusts the sunlight coming into a room by changing the position of a window main body, the window main body being extended outside of the wall in winter so that the space of the window illuminated by sunlight is turned into an indoor space for the purpose of lightening and warming, while the window main body being retracted inside of the wall in summer so that the space of the window illuminated by strong sunlight is turned into an outdoor space for the purpose of shadowing and avoiding sunlight exposure.

2. An energy-saving window applying the energy saving method according to claim 1, characterized in that the energy-saving window comprises a window frame and a window main body, the window frame being provided thereon with vertical shafts or guide rails, the vertical shafts or guide rails being in fixed connection with the window frame while in movable connection with the window main body, the window main body rotating via the vertical shafts or moving via the guide rails to change the position thereof.

3. The energy-saving window according to claim 2, characterized in that the vertical shafts are located in the middle of the window frame, and the window main body is of an arched structure formed of a polyhedron, with upper and lower end faces of the window main body being rotatably connected with the vertical shafts.

4. The energy-saving window according to claim 3, characterized in that the window main body is trapezoidal.

5. The energy-saving window according to claim 3, characterized in that the window main body is drum-shaped.

6. The energy-saving window according to claim 3, 4 or 5, characterized in that there are one to six window main bodies.

7. The energy-saving window according to claim 6, characterized in that each of the vertical shafts is of a half-shaft structure fixed on the upper and lower end faces of the window frame and extended outward.

8. The energy-saving window according to claim 2, characterized in that the window main body is of a planar structure, to which the guide rails are vertical.

9. The energy-saving window according to claim 2, characterized in that the window main body is of a drum-shaped structure, the planar window main body in the middle of the drum-shape being corresponding to the guide rails vertical to the window main body, while the arc window main body on two sides of the drum-shape being fitted with the arc guide rails.

10. The energy-saving window according to claim 2, characterized in that the window main body is of a trapezoidal structure, the planar window main body in the middle of the trapezoid being fitted with the guide rails vertical to the window main body, vertical shafts being provided on the insides of two ends of the window frame, respectively, two side surfaces of the trapezoidal window main body being hinged with the vertical shafts.

11. The energy-saving window according to claim 8, 9 or 10, characterized in that there are one to six planar window main bodies.

12. The energy-saving window according to 2, 3, 4, 5, 9 or 10, characterized in that a sun shield is provided outside the upper end of the window frame.