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(54) Aerator for roofs of industrial buildings.

(57) An aerator for roof covers, particularly suited to industrial buildings comprises: a metal frame (1, 10) with a box-structure with or without a trestle, fixed to two or more beams, (2, 11) supporting the roof and lodged in an opening on the roof; a movable element (3, 15) consisting of a metal structure supporting at the top a cover (4, 18, 19) and having bars (14) vertically sliding within lodgings (13) belonging to the metal frame; means for the vertical drive of the movable element (3, 15) in relation to the metal frame (1, 10) suited to remove the movable element from the frame and to create a diaphragm with variable surface for the passage of the air between the movable element and the opening which is created by the lifting of the cover.

In a preferred embodiment the driving means consist of a geared motor (25) with an idle shaft (24) presenting at each end a cog wheel (22, 23) engaging a rack (20, 21), wherein the geared motor is firmly connected with the frame and the racks are connected with the cover (18, 19).

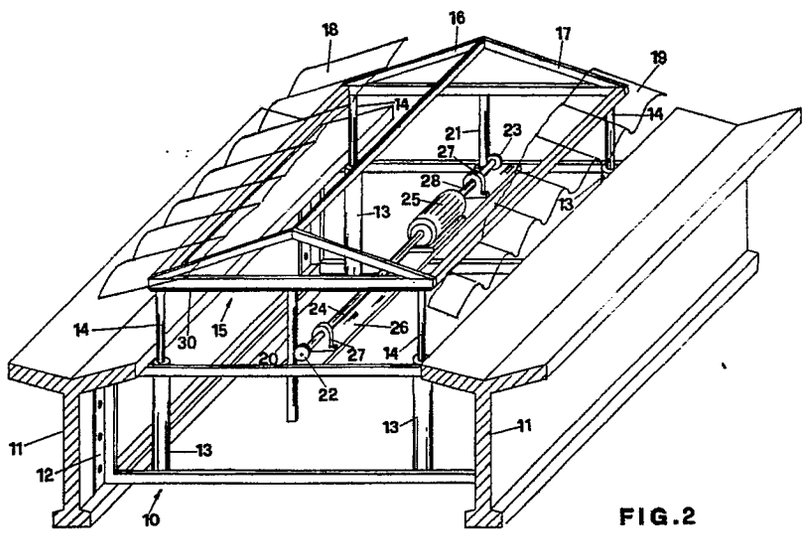

FIG.2

EP 0 405 386 A2

The invention concerns an aerator particularly suited to ventilate industrial buildings, creating openings, in the roofs, whereby the surface for the passage of the air can be varied according to need.

In the industrial buildings, which are used for manufacturing goods, or storing them, a sharp rise in the room temperature may occur, due to an excess of sunshine during the day.

The temperatures which can be reached inside the buildings are often higher than the bearable, and the increase in the room temperature is particularly dangerous when people are working.

It is known that when people are working, they need a certain degree of environmental comfort in order to be able to work efficiently without any dammage to their health.

The ventilation methods which are currently used, particularly for large buildings, consist, when possible, in keeping the main doors open in order to create the right draughts, or they consist in keeping the windows which are on the vertical walls or even directly on the roofs open.

In the latter case the windows creating the passage of the air are usually opened at the beginning of the summer and they are closed when summer is over; this is due to the fact that often the opening of the windows is a rather complicated operation which sometimes requires the presence of people on the roof, where the opening is performed by sliding the windows open.

Said type of openings cause some inconveniences which are sometimes not of minor importance, such as the seepage of water during the summer thunderstorms.

To avoid such inconveniences, some new buildings are provided with a small domes made of plexiglass or of a similar material which are movable and can be opened through a hinge, through motors suited to the purpose, so that variable and partial openings are obtained in some specific areas of the roof.

One of the limits of such a system is that the section through which the air passes, is quite limited, and therefore it is necessary to set many openable domes when the volume of air required especially in very large workshops is sizeable, or the ventilation obtained is quite limited.

Moreover the problem of the water seepage in case of bad weather remains unsolved.

As far as old buildings are concerned, it is extremely difficult to create a good ventilation systems in structures which do not have sufficient openings.

The present invention has been created in order to overcome these inconveniences, its main purpose being that of creating an aerator, preferably suited to industrial buildings, which is very simple and that can be installed even in buildings of old construction.

Another purpose of the invention, is to create an efficient ventilation with a wide variability of the section for the passage of the air.

A further purpose to be reached is for the equipment constituting the aerator to be cheap and easy to install in various existing structural situations, without any need for substantial and expensive variations.

All these purposes and others which will be better explained later are reached by an aerator for the covering of roofs, in particular for the industrial buildings which, according to the main claim, is characterized in that it comprises:

- a metal frame presenting a box-type structure with or without a trestle, fixed to two or more beams supporting the roof and lodged in an opening created on the roof itself;
- a movable element consisting in a metal structure, supporting at the top a cover and having vertical slide bars sliding within supports situated in the metal frame;
- means for the vertical movement of the movable element in relation to the frame, suited to remove the movable element from the frame and to create a diaphragm with a variable surface for the passage of the air through the opening which is created by the lifting of the cover of the movable element.

According to a preferred embodiment of the invention, the movable element slides vertically in relation to the frame, since it is provided with a geared motor wherein, at each end of the idle shaft, there is a cog-wheel, which engages a rack that is vertically arranged and permanently connected to the movable element.

It is easy to understand that, in this way, the action of the geared motor, which is permanently connected with the frame, causes the movement of the rack and therefore, the lifting or the lowering of the movable element in relation to the opening created on the roof.

When resting, i.e when the movable element is closed, the cover leans against the opening created on the roof, the presence of a washer which runs along the whole perimeter of the cover, creates the tightness between the cover and the edge of the opening of the roof, so that any possible passage of water or of cold air, during the winter time, is avoided.

The advantage of the aerator of the invention is evident, since it can be easily understood that it substantially consists of metal structures of simple construction and of equally simple means of lifting.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter.

However, it should be understood that that the

detailed description and specific example, while indicating a preferred embodiment of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description, and from the drawings, wherein:

- Fig. 1 shows a sketch of the principle of the aerator of the invention;
- Fig. 2 presents an example of embodiment of the aerator of the invention in a perspective view.

With reference to Fig. 1, it can be observed that the aerator of the invention consists of a metal frame 1, which is permanently fixed to the beams 2, belonging to the roof.

A movable element 3, which supports a cover 4, normally made of a transparent material like, for example, a cover made of an alveolar polycarbonate or similar, is made to slide in the vertical direction, through a rack 5, which is permanently connected to the movable element 3 and engages the cog wheel of a geared motor 6; when the cog wheel of the geared motor 6, which is not represented in Fig.1, engages the rack 5, the movable element 3, rises or drops in relation to the fixed part of the roof, and in particular in relation to the type "y" beams, so that the section for the entrance of the air varies.

The difference in the temperature between the exterior and the interior of the building, creates some natural convective motions of air, which realize the airing in the interior of the building and, therefore, its cooling.

Fig. 2 represents an example of embodiment of the aerator of the invention.

In this example the metal frame 10 is made with box-structure section bars and is fixed to the two "y"-shaped beams 11 supporting the roof, through a flange 12, which is attached by means of bolts directly to the side of the beam.

The pipes 13, which are arranged at the four corners of the opening created on the roof and which lodge the bars 14 of the movable element 15, belong to the frame 10 too.

Said movable element 15 consists of a metal structure which presents at the top two sloping frames 16 and 17, suited to support two elements 18 and 19 of the transparent cover, which are fixed respectively to the frames 16 and 17.

The racks 20 and 21, which are positioned along the centre line of the movable element 15, extend downwards at the opposite sides, belong to the movable element 15 too.

Said racks 20 and 21 engage respectively the cog wheels 22 and 23 which are fixed to the opposite edges of the idle shaft 24, belonging to the geared motor 25.

The geared motor 25 is positioned on a support sheet 26, which is firmly connected to the frame 10.

In the case illustrated in the figure, since the structure of the metal frame is sufficiently long, it is necessary for the idle shaft 24 of the geared motor 25 to be supported by the supports 27 and 28 near the protrusions of the shaft, so that the cog wheels 22 and 23 are well driven.

When the geared motor 25 is activated, for instance so that the racks 20 and 21 move upward, the whole movable element 15 rises and therefore between the movable element 15 and the opening on the roof such a diaphragm is obtained that the air can pass through the four sides very easily.

The movable element 15, during its lifting and its lowering movements, is driven by four tubular elements 14 which slide into as many fixed elements 13, so that the movable element is safely driven and therefore the racks 20 and 21 work in the best way.

All around the perimeter of the movable element 15, in the frame which comes into contact with the opening of the roof during the lowering operation, there is a washer 30 which is represented only partially in the figure for reasons of graphic simplicity, but which is extremely important because it prevents, during the winter time or during possible rain or thunderstorms, the seepage of water from the opening of the roof which lodges the aerator.

The washer functions equally effectively even as an air seal, when, during the winter, it necessary to prevents the entrance of cold air from the top or, however, the exit of the heated air in the interior of the building.

In the practical realization of the invention, it is possible to change the driving means of the movable element in relation to the metal frame: for instance it can be done that the movement can be obtained by hydraulic cylinders or through pneumatic cylinders, without exceeding the scope of the invention.

In the case of a particularly wide aerator,and in the case a rack-driving system is used, more than two racks can be used and this in order to distribute the stress with a larger margin of operational safety. It is also evident that both the cover and the perimeter of the opening lodging the aereator, and consequently the perimeter of the frame belonging to the aereator scan be of variable shapes.

Claims

1) Aerator for roof covers, particularly suited to industrial buildings, characterized in that it comprises:

- a metal frame (1, 10) with a box-structure with or without a trestle, fixed to two or more beams, (2, 11) supporting the roof and lodged in an opening on the roof;
- a movable element (3, 15) consisting of a metal structure supporting at the top a cover (4, 18, 19) and having bars (14) vertically sliding within lodgings (13) belonging to the metal frame;
- means for the vertical drive of the movable element (3, 15) in relation to the metal frame (1, 10) suited to remove the movable element from the frame and to create a diaphragm with variable surface for the passage of the air between the movable element and the opening which is created by the lifting of the cover.

2) Aerator according to claim 1, characterized in that the means which create the reciprocal vertical sliding between the frame (1, 10) and the movable element (3, 15) consist of a geared motor (25) with an idle shaft (24) presenting at each end a cog wheel (22, 23) engaging a rack (20, 21), wherein the geared motor is firmly connected with the frame and the racks are connected with the cover (18, 19).

3) Aerator according to claim 1), characterized in that the movable element (3, 15) supporting the cover presents a section bar which is equipped with a washer (30) having a perimetric development so that it matches and seals the perimetral edge of the opening, created on the roof.

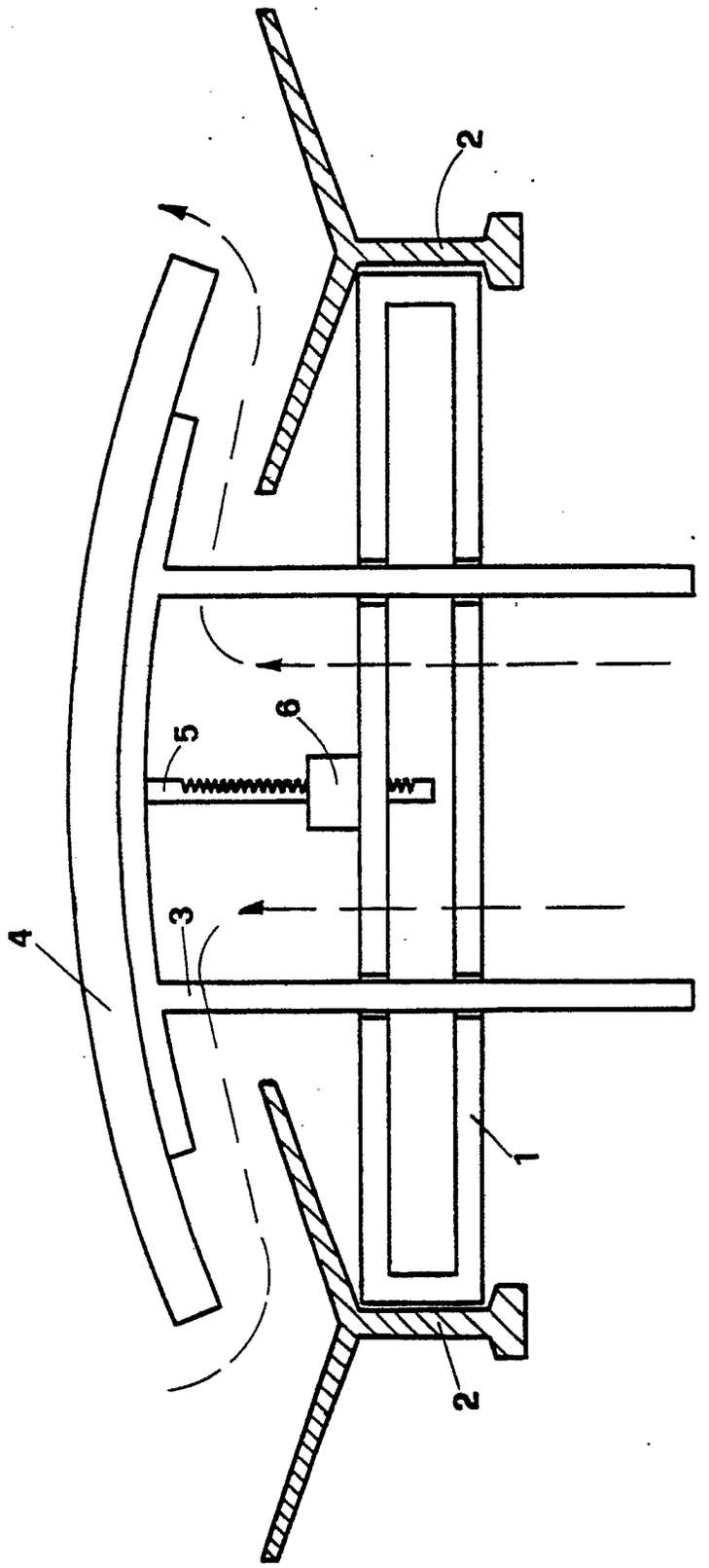

FIG.1

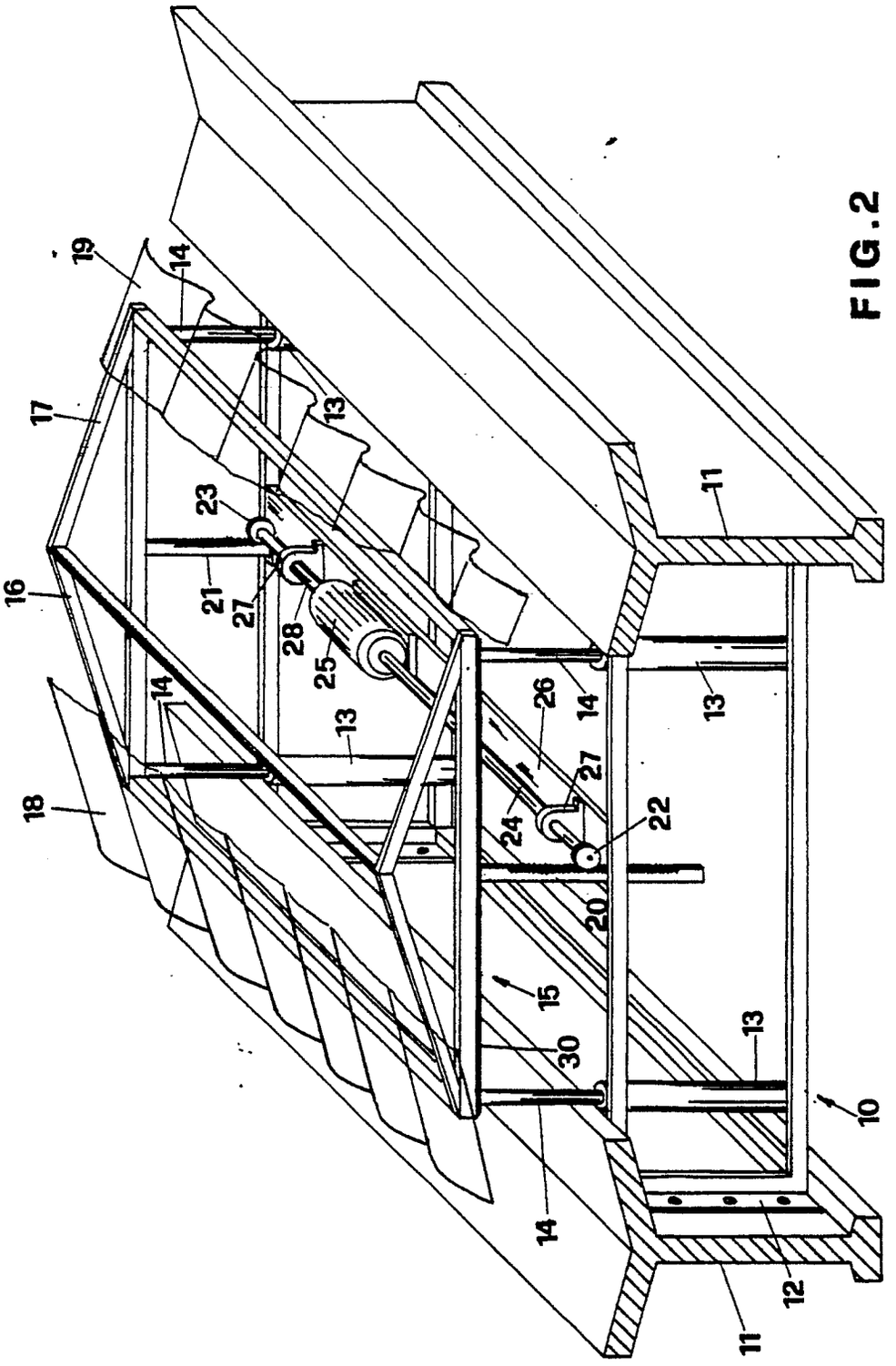
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FIG.2