(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 500 488 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.09.2012 Bulletin 2012/38

(21) Application number: **12159560.7**

(22) Date of filing: **15.03.2012**

(51) Int Cl.:
E04D 13/035 *(2006.01)* ***E04D 15/04*** *(2006.01)*
E05F 11/06 *(2006.01)* ***E05F 15/12*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **18.03.2011 BE 201100171**

(71) Applicant: **AG Plastics NV**
8530 Harelbeke (BE)

(72) Inventor: **Glorieux, Rik**
8530 Harelbeke (BE)

(74) Representative: **D'Halleweyn, Nele Veerle Trees Gertrudis et al**
Arnold & Siedsma
Sweelinckplein 1
2517 GK Den Haag (NL)

(54) Profile assembly for a roof light element

(57) Profile assembly for use in a roof light element, such as a roof window or a dome skylight, comprising a number of mutually connecting edge profiles which are intended to extend along the periphery of at least one light-transmitting element such as a plate or a dome element; and are adapted to be connected thereto, wherein a first edge profile of the number of edge profiles is provided with a hollow chamber, and a motor or cylinder is received in the hollow chamber, wherein an elongate support element connected to the motor or cylinder protrudes through an underside of the edge profile and is movable outward by the motor or cylinder, which elongate support element has an end intended for connection to an upstand, this such that the motor or cylinder can raise the profile assembly with the at least one light-transmitting element from the upstand by moving the elongate support element outward for the purpose of opening the roof light element.

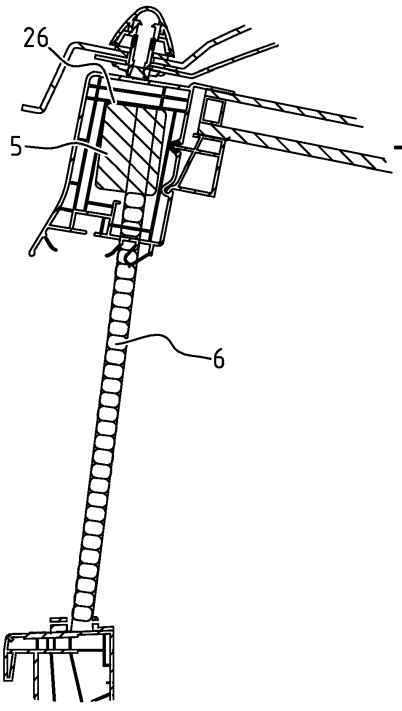


FIG. 3A

EP 2 500 488 A2

Description

[0001] The present invention relates to a profile assembly for use in a roof light element, such as a roof window or a dome skylight. Such a profile assembly typically comprises a number of mutually connecting edge profiles intended to extend along the periphery of at least one light-transmitting element such as a panel and/or a dome element. These edge profiles are further adapted to be connected to this at least one light-transmitting element.

[0002] Such profile assemblies are used in opening roof light elements. It is known to build a motor into an upstand. Using such a motor built into the upstand the profile assembly can be raised from the upstand in order to open the roof light element. Such an embodiment in which the motor is built into the upstand has the drawback that a recess has to be cut into the upstand, and that in the open position of the roof light element water and/or dirt can enter the chamber in which the motor is situated.

[0003] The object of the present invention is to provide a profile assembly and roof light assembly of the type stated in the preamble which can better withstand rain and enable a simple installation and/or replacement of a roof light element.

[0004] The profile assembly according to the invention is distinguished for this purpose in that a first edge profile of the number of mutually connecting edge profiles is provided with a hollow chamber, and that a motor or a cylinder is received in the hollow chamber. An elongate support element movable by the motor or the cylinder protrudes through an underside of the edge profile and has an end intended for connection to the upstand. In this way the motor or the cylinder can raise the profile assembly with the at least one light-transmitting element from the upstand by moving the elongate support element outward such that the roof light element is opened.

[0005] The motor or cylinder is thus built into a frame which bears the at least one light-transmitting element and is consequently invisible when the roof light element is open or closed. The motor or cylinder is thus placed as it were upside down and is raised together with the frame formed by the edge profiles and the at least one light-transmitting element. The motor or cylinder can for instance be inserted into the first edge profile before joining the mutually connecting edge profiles to each other. The motor or cylinder is in this way not exposed to driving rain and there is consequently no danger of short-circuit. The profile assembly with the at least one light-transmitting element can further be wholly assembled in the factory such that no cutting work is required during placing of the roof light element. Installation will therefore be quite simple. Finally, existing roof light elements can easily be replaced by a roof light element with a profile assembly according to the invention without breaking work being necessary.

[0006] According to an advantageous embodiment a motor, typically an electric motor, is used and the elongate support element is a chain, a gear rack or a spindle. According to another possible embodiment a cylinder, typically a pneumatic cylinder, is used and the elongate support element is a piston rod or a stiff element coupled thereto.

[0007] In a preferred embodiment the elongate support element is a chain which is flexible in one plane but stiff in any other plane. Motors with such a chain have the advantage of being quite compact and inexpensive. The motor is preferably mounted in the edge profile such that the plane in which the chain is to some extent flexible is parallel to the edge profile.

[0008] According to a further developed embodiment, the hollow chamber has dimensions which are larger than the dimensions of the motor. More particularly, the first edge profile is preferably adapted such that the motor is tiltable to limited extent relative to the first edge profile. According to an advantageous embodiment, the first edge profile has a longitudinal direction and the hollow chamber is bounded by two side walls extending in the longitudinal direction, wherein a support flange extending in the longitudinal direction is provided at a distance from the side walls at the bottom of the hollow chamber. The distance between the side walls is preferably greater than the width of the motor. In this way the motor will, in the closed position of the roof light element, be tiltable to limited extent around the support flange, which is preferably a relatively narrow flange. The hollow chamber preferably further has an inclining upper wall which extends between the two side walls and which runs inclining upward from an outer wall of the first edge profile to an inner wall thereof. The motor will in this way be able to tilt relative to the upper wall during the movement from the open to the closed position.

[0009] According to an advantageous embodiment, a second edge profile intended for placing opposite the first edge profile is adapted to be connected hingedly to the upstand. Note however that according to another embodiment it is also possible to provide one or more motors or cylinders in different edge profiles such that the roof light element can be raised as a whole from the upstand.

[0010] According to another aspect of the invention, a profile assembly is provided with four edge profiles, each provided at the underside thereof with a cable duct extending in the lengthwise direction thereof for receiving a power supply cable, for instance an electrical cable for powering the motor, or a pneumatic cable for powering a pneumatic cylinder. Such a cable duct can be provided with a longitudinal opening bounded by a flexible flange. This flexible flange is dimensioned such that a power supply cable can be introduced and held in the cable duct. It will in this way be possible to carry a power supply cable from the motor or cylinder via the cable duct to a second edge profile connected hingedly to the upstand and connect the cable from here to a power source, for instance the mains electricity in the case of an electrical cable.

[0011] The invention further relates to a roof light as-

sembly comprising an embodiment of a profile assembly as described above and at least one light-transmitting element such as a panel or a dome element.

[0012] According to yet another aspect of the invention, each edge profile is provided with a support flange for a light-transmitting plate. This support flange preferably extends from the inner wall of the edge profile, still more preferably substantially in line with the upper wall of the edge profile. A light-transmitting plate can then be fixed against the underside of this support flange. The inner wall of an edge profile can further be adapted for connection to a clamping profile. One or more light-transmitting plates can in this way be received between such a clamping profile and the support flange. Such an embodiment has the advantage that the roof light assembly, when no dome elements are used, can nevertheless drain water well, since the upper side of such a roof light element will be substantially flat. When such a roof light element is then arranged at a slight inclination, it will be easily possible to drain water.

[0013] According to a further aspect of the invention, there is provided for each edge profile a clamping profile which is connectable to the inner wall of the edge profile, wherein at least one light-transmitting plate is received between this clamping profile and the support flange.

[0014] According to yet another aspect of the invention, at least one light-transmitting dome element is mounted on the upper walls of the mutually connecting edge profiles.

[0015] According to yet another aspect of the invention, the light-transmitting dome element is provided at its periphery with a peripheral flange directed inclining downward and extending along the outer wall of each edge profile.

[0016] According to a possible variant, one or more light-transmitting dome elements can be mounted on the upper walls of the edge profiles. Note that such light-transmitting dome elements can be used in combination with light-transmitting plates, but can also be arranged on the edge profiles without the light-transmitting plates.

[0017] A light-transmitting element as stated above can be a light-transmitting plate-like element or a light-transmitting dome element. A light-transmitting element can for instance be manufactured from glass or from plastic. The light-transmitting element can more particularly be manufactured from for instance polycarbonate, polymethyl methacrylate, styrene acrylonitrile, glass fibre-reinforced polyester, polyethylene terephthalate, polyvinyl chloride or the like.

[0018] The present invention will be further elucidated on the basis of a number of exemplary embodiments of a profile assembly and a roof window and dome assembly according to the invention with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of an embodiment of a dome assembly according to the invention;

Figure 2 shows a cross-section of an embodiment of a dome assembly according to the invention mounted on an upstand in the closed position of the dome;

Figure 2A shows a detail view of the part A of figure 2;

Figure 3 shows a cross-section of the embodiment of the dome assembly according to figure 2 in the open position of the dome;

Figure 3A shows a detail view of the part A in figure 3; and

Figures 4A and 4B show views of a chain motor which can be used in a profile assembly according to the invention.

[0019] Figure 1 shows a dome assembly 1 with a light-transmitting dome element 3 mounted on a profile assembly 2 extending along the periphery of the light-transmitting dome element 3. A light-transmitting plate can also be used instead of a light-transmitting dome element 3 such that a roof window is formed. A single or multi-walled light-transmitting dome element 3 can further be combined with one or more light-transmitting plate elements, see for instance the embodiment of figure 2. In the embodiment illustrated in figure 1 the profile assembly 2 forms a frame which is connected on one side to upstand 4 for pivoting around an axis A. Note that the term upstand should be interpreted broadly as being any possible support for frame 2. One or more motors or cylinders 5 are received in frame 2. Each motor or cylinder is provided with an elongate support element 6 which is movable by the motor and which protrudes outward through an underside of frame 2 and is connected to upstand 4. The motors or cylinders 5 can in this way raise the profile assembly 2 with dome element 3 and/or light-transmitting plate from upstand 4 by moving outward from frame 2 the elongate support elements 6 connected at their outer end to upstand 4.

[0020] A more detailed embodiment of such a roof assembly will now be described with reference to figures 2, 2A, 3 and 3A. Figure 2 illustrates in cross-section a dome assembly 10 with a frame 20 consisting of four mutually connected edge profiles, of which a first edge profile 21 and a second edge profile 27 are shown. Frame 20 supports on the one hand the dome 30 consisting of a first dome wall 33 and a second dome wall 34 and on the other a two-walled light-transmitting plate 31, 32. Note that the same frame 20 can be used with only one or more dome walls without the light-transmitting plates 31, 32. Frame 20 can also be used with only one or more light-transmitting plates 31, 32 without dome elements 33, 34. Frame 20 is supported on an upstand 40 and is connected hingedly on one side 41 to upstand 40. A motor 5 is received in frame 20 on the other side 41. The cross-section shown in figures 2, 2A, 3 and 3A is taken at the position of a motor built into frame 20. Note that, in accordance with the dimensions of dome assembly 10, one or more motors can be built into frame 20.

[0021] The first edge profile 21 is provided with a hollow

chamber 22 in which motor 5 is received. An elongate support element 6, here a chain, movable by the motor protrudes through the underside of the first edge profile 21 and is connected to upstand 40, typically by means of a fixing plate 43. The motor and the elongate element movable by the motor are embodied here as a chain motor, although the skilled person will appreciate that a similar configuration is possible with a spindle motor or a gear rack motor or with a cylinder. Chain 6 is typically a chain which is flexible in one plane and otherwise stiff. Chain 6 is flexible in a plane parallel to the first edge profile. In the illustrated embodiment where frame 20 is mounted hingedly on upstand 40 on a first side 41, the first edge profile 21 on the other side 42 will make a circular movement during opening of the dome. Chain 6, which has rigid characteristics in the plane of the circular movement, will require that the motor can tilt to some extent in hollow chamber 22, see figure 3. The first edge profile 21 is after all mounted rigidly in dome assembly 10 and so follows the circular movement. By giving hollow chamber 22 dimensions which are larger than the dimensions of motor 5 the motor 5 can take up different positions relative to the first edge profile 21. When the dome is opened, motor 5 will typically come to lie at less of an incline than the other part of the first edge profile 21. In order to enable this tilting movement of the motor relative to the first edge profile there is provided in hollow chamber 22, at the underside thereof, a support flange 23 which extends in the longitudinal direction of the first edge profile 21 at a distance from the side walls 24, 25 bounding hollow chamber 22. The distance between side walls 24, 25 is preferably slightly greater than the width of motor 5. During closing of the dome the motor 5 will, as the dome draws near to the closed position, make contact with support flange 23 and so remain tiltable to some extent relative to the first edge profile 21. The same applies during opening of the dome: the start of the movement is the tilting on support flange 23, after which motor 5 moves clear of this support flange 23 and makes contact with the upper wall 26 bounding hollow chamber 22.

[0022] A second edge profile 27 extends parallel to the first edge profile 21 and is provided with connecting means for hinged connection of the second edge profile 27 to upstand 40. The first edge profile 21 is typically connected to the second edge profile 27 via a third and a fourth edge profile such that a frame 20 is formed along the periphery of the transmitting panels/dome elements 31-34. These first, second, third and fourth edge profiles are preferably embodied in substantially the same manner such that they can be easily welded to each other at the corners. The edge profiles are preferably provided with a cable duct for a power supply cable, for instance an electrical cable in the case of a motor or a compressed air cable in the case of a cylinder. Provided on the underside of the first edge profile 21 in the illustrated embodiment is a cable duct 28 in which power supply cables can be arranged along the underside thereof. The underside of cable duct 28 is preferably embodied with a flexible flange 29 which is dimensioned and adapted to enable the insertion and holding of a power supply cable in the cable duct. This flexible flange is preferably a flange of a soft PVC material. A power supply cable for the electric motor or cylinder 5 can in this way be carried, in a manner which is convenient and invisible from outside, from the electric motor or cylinder to the hinge side 41, where the power supply cable can for instance be connected through upstand 40 to the mains electricity in the case of an electric motor. On the underside of the first edge profile 21 a number of flexible sealing tongues 51, 52, 53 can further be provided which can for instance be manufactured from a soft PVC material.

[0023] The first edge profile has a lower wall 64, an upper wall 63, an outer wall 61 and an inner wall 62. Outer wall 61 preferably has on its underside a portion bending away outward which provides for a good drainage. Provided on the one hand on inner wall 62 is a support flange 65 extending substantially in the line of upper wall 63 and on the other grooves 66, 67 in which a clamping profile 68 can be secured. Glass plates 31, 32 can in this way be received, with interposing of a spacer 35, between support flange 65 and clamping profile 68. The use of such a support flange 65 in line with upper wall 63 has particular advantages when the roof assembly is used without dome elements 33, 34. The use of such a support flange will enable easy drainage of water present on glass plate 32 when the roof assembly is placed at a slight incline.

[0024] Dome elements 33, 34 are preferably mounted on the upper wall 63 of the first edge profile 21. The outer dome element 33 is preferably further provided with a downward directed inclining portion 36 for the purpose of forming a suitable drainage. Dome elements 33, 34 can be mounted against upper wall 63 in known manner using mounting means 37.

[0025] The first, second, third and fourth edge profiles are preferably embodied in similar manner and are preferably provided with a chamber structure between the lower wall 64, upper wall 63, inner wall 62 and outer wall 61 on the one hand and hollow chamber 22 on the other. This imparts the necessary strength to the edge profiles and also provides for good insulation. Dome elements 33, 34 can for instance be manufactured from polymethyl methacrylate (PMMA) or polycarbonate or the like. Upstand 40 and edge profiles 21 can for instance be manufactured from PVC or from a composite material. The light-transmitting panel elements 31, 32 can for instance be a double burglar-proof HE++ security glazing.

[0026] A receiver connected to the motor is preferably further provided in frame 20 for receiving signals from a remote control for operating the motor. Frame 20 or the upstand can further be provided with a battery powered by one or more solar cells for the purpose of driving the motor 5. These solar cells can for instance be placed on the roof and connected to the battery. The battery need not be accommodated in the frame or the upstand and can also be incorporated in other manner in another

structure. Wind and/or rain detection means can also be provided for automatic control of the motor in order to close the dome automatically for instance in the case of heavy rainfall.

[0027] Finally, figures 4A and 4B show a possible embodiment of a chain motor which can be used in a profile assembly according to the invention. This is a motor from the Topp Spa company with a chain 6 driven by a toothed wheel 60 which is driven by the motor via a number of toothed wheels 61 (only a few toothed wheels are visible in the figures).

[0028] It will be evident that the invention is not limited to the above described exemplary embodiments and that many variants and modifications can be envisaged without departing from the scope of the invention, which is defined solely by the following claims. It is thus also possible for instance to provide a plurality of motors or cylinders in the frame, wherein the frame is raised as a whole from the upstand and is not connected hingedly on one side to the upstand. The motors or cylinders can further be controlled in order to raise for instance one side of the frame further upward than an opposite side so as to thus place the frame in a tilted position relative to the upstand at a distance from the upstand.

Claims

1. Profile assembly for use in a roof light element, such as a roof window or a dome skylight, comprising a number of mutually connecting edge profiles which

   - are intended to extend along the periphery of at least one light-transmitting element such as a plate or a dome element; and
   - are adapted to be connected thereto, **characterized in that** a first edge profile of the number of edge profiles is provided with a hollow chamber, and that a motor or a cylinder is received in the hollow chamber, wherein an elongate support element connected to the motor or cylinder protrudes through an underside of the edge profile and is movable outward by the motor or cylinder, which elongate support element has an end intended for connection to an upstand, this such that the motor or cylinder can raise the profile assembly with the at least one light-transmitting element from the upstand by moving the elongate support element outward for the purpose of opening the roof light element.

2. Profile assembly as claimed in claim 1, **characterized in that** a motor is received in the hollow chamber and that the elongate support element is a chain, a gear rack or a spindle.

3. Profile assembly as claimed in claim 1 or 2, **characterized in that** a cylinder is received in the hollow chamber and that the elongate support element comprises a piston rod.

4. Profile assembly as claimed in claim 2, **characterized in that** the chain is flexible in one plane and otherwise stiff, wherein the motor and the chain are mounted such that this one plane is parallel to the first edge profile.

5. Profile assembly as claimed in any of the foregoing claims, **characterized in that** the hollow chamber comprises a motor and that the hollow chamber has dimensions which are larger than the dimensions of the motor.

6. Profile assembly as claimed in any of the foregoing claims, **characterized in that** the first edge profile is adapted such that the motor is tiltable to limited extent relative to the first edge profile.

7. Profile assembly as claimed in any of the foregoing claims, **characterized in that** the hollow chamber comprises a motor, that the first edge profile has a longitudinal direction and that the hollow chamber is bounded by two side walls extending in the longitudinal direction, and that a support flange extending in the longitudinal direction is provided at a distance from the side walls at the bottom of the hollow chamber.

8. Profile assembly as claimed in claim 7, **characterized in that** the motor has an underside which, in the closed position of the roof window or the dome skylight, is supported on the support flange, this such that the motor is tiltable to limited extent relative to the side walls of the first edge profile.

9. Profile assembly as claimed in any of the foregoing claims, wherein the first edge profile has an outer wall and an inner wall, **characterized in that** the hollow chamber is bounded by an upper wall which runs inclining upward in the direction from the outer wall to the inner wall, this such that the motor can tilt to some extent relative to the upper wall during opening of the roof window or the dome skylight.

10. Profile assembly as claimed in any of the foregoing claims, **characterized in that** a second edge profile of the number of edge profiles is adapted to be connected hingedly to the upstand and that the first edge profile is substantially parallel to the second edge profile.

11. Profile assembly as claimed in claim 10, **characterized in that** the first edge profile is connected to the second edge profiles via a third and a fourth edge profile, wherein at least the first, third and fourth edge profiles are provided on the underside thereof with

a cable duct extending in the lengthwise direction thereof for receiving a power supply cable for powering the motor or cylinder.

12. Profile assembly as claimed in claim 11, **characterized in that** each cable duct is provided with a longitudinal opening bounded on at least one longitudinal side thereof by a flexible flange dimensioned to enable the insertion and holding of a power supply cable in the cable duct.

13. Roof light assembly comprising a profile assembly as claimed in any of the foregoing claims and at least one light-transmitting element.

14. Roof light assembly as claimed in claim 13, **characterized in that** each edge profile has a lower wall, an upper wall, an inner wall and an outer wall, wherein each edge profile is provided with a support flange for a light-transmitting element, which support flange extends from the inner wall.

15. Roof light assembly as claimed in claim 14, **characterized in that** the support flange extends substantially in line with the upper wall, wherein a light-transmitting plate supports against the underside of each support flange.

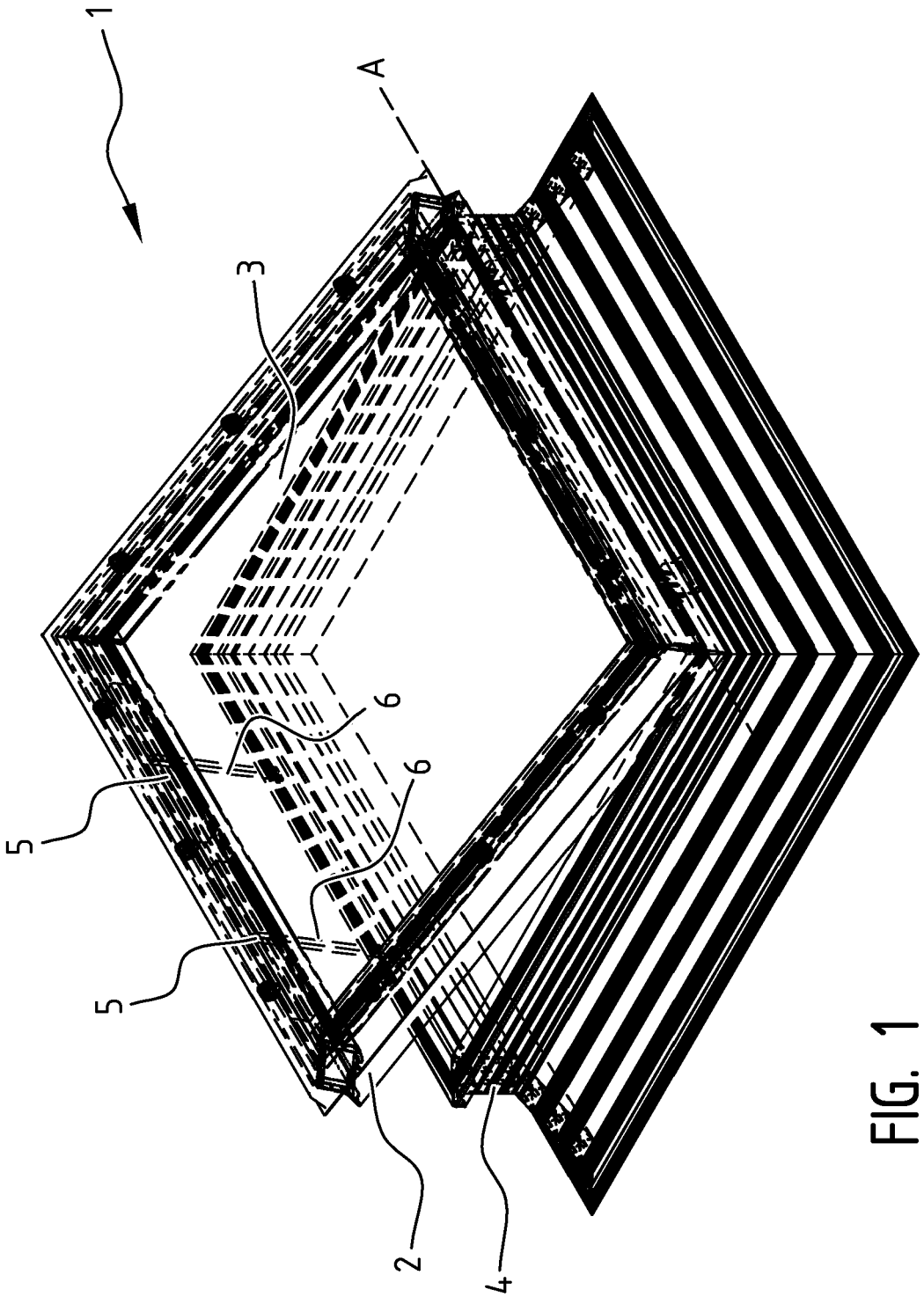
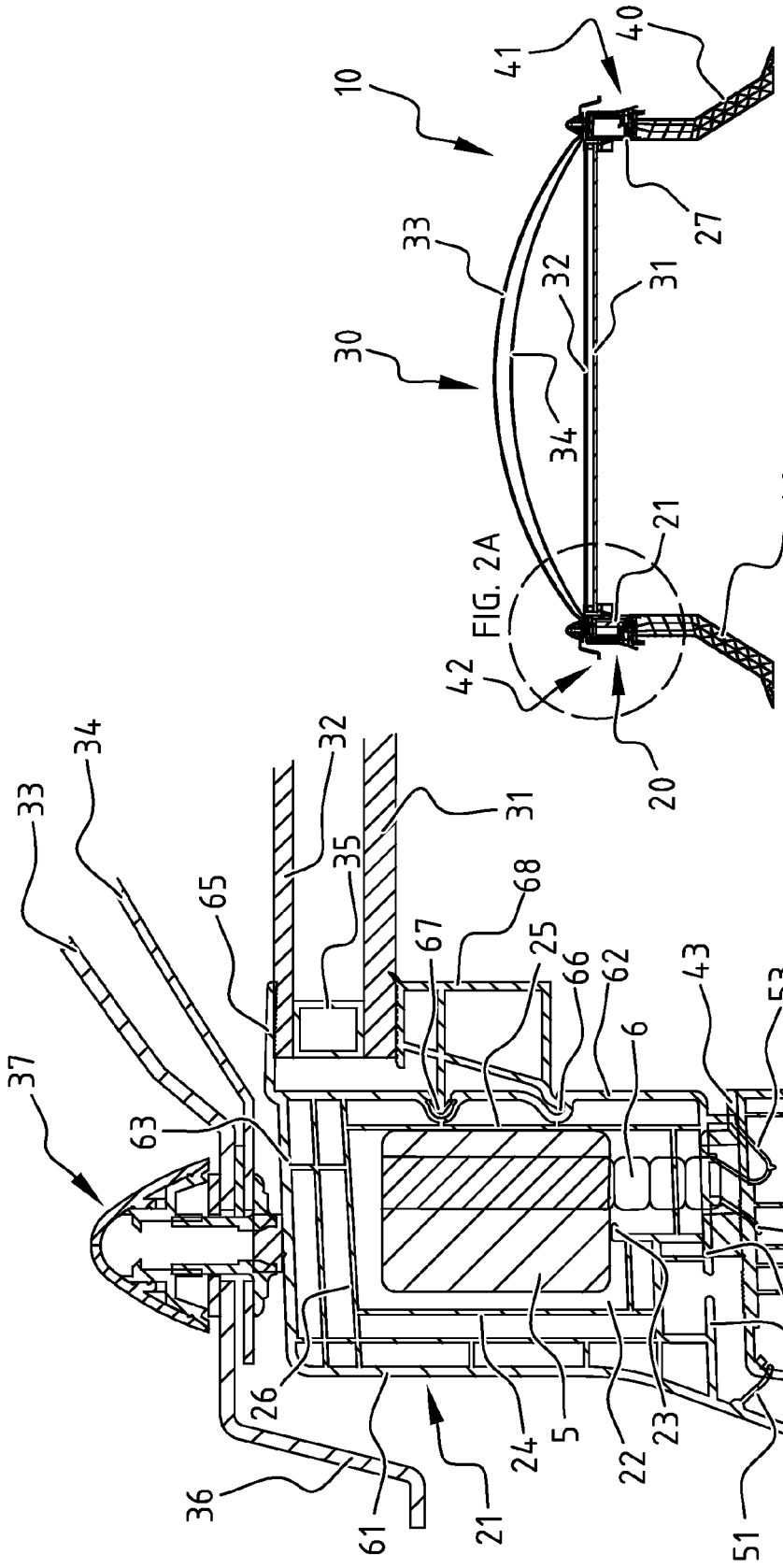


FIG. 1


10
41
40
27
33
32
31
30
34
21
40
FIG. 2A
42
20
FIG. 2
34
33
32
31
65
35
68
67
25
66
62
43
53
40
37
63
6
52
64
26
24
5
22
23
29
36
61
21
51
FIG. 2A

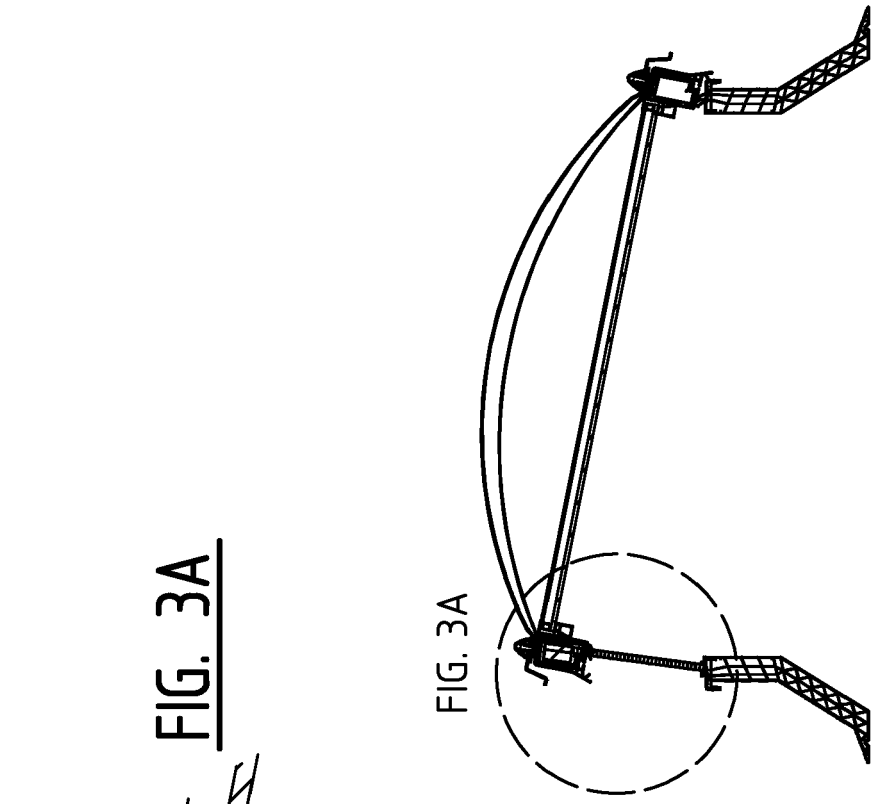


FIG. 3

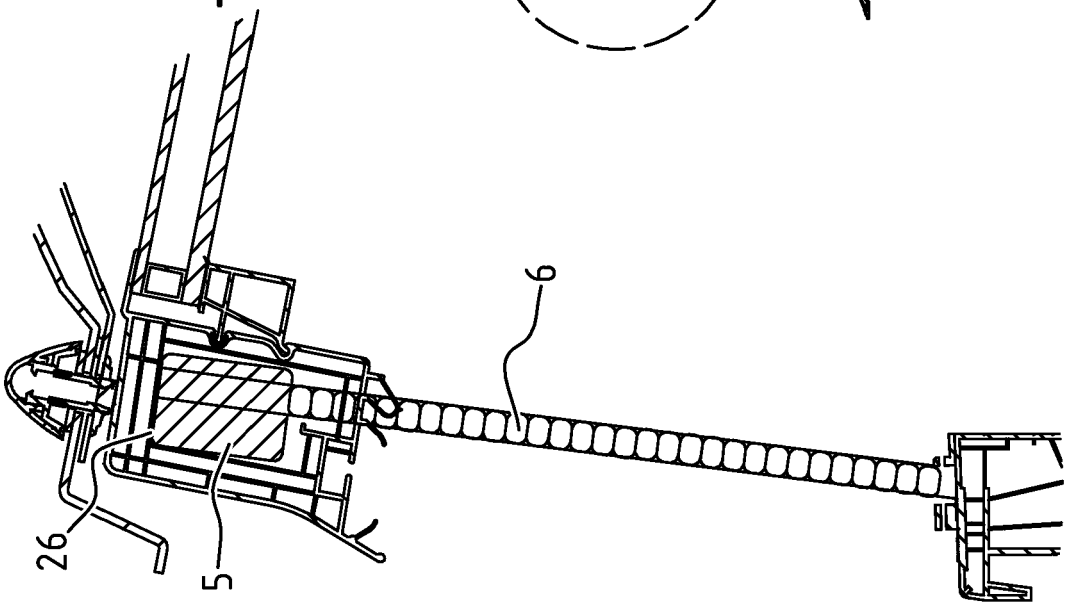


FIG. 3A

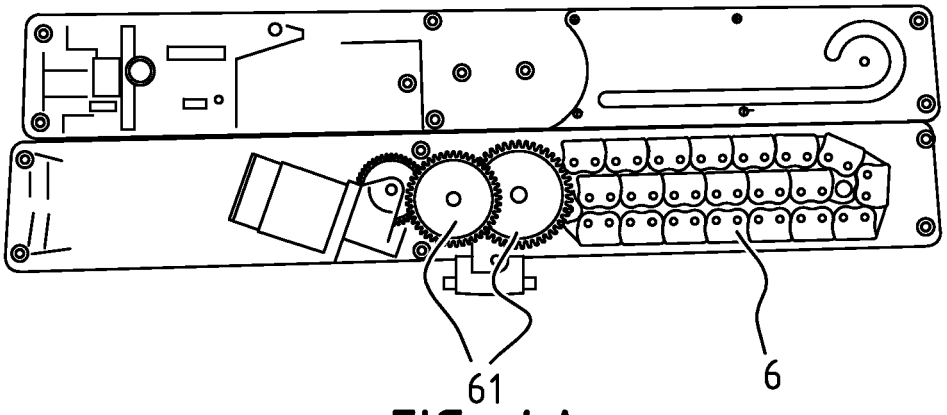


FIG. 4A

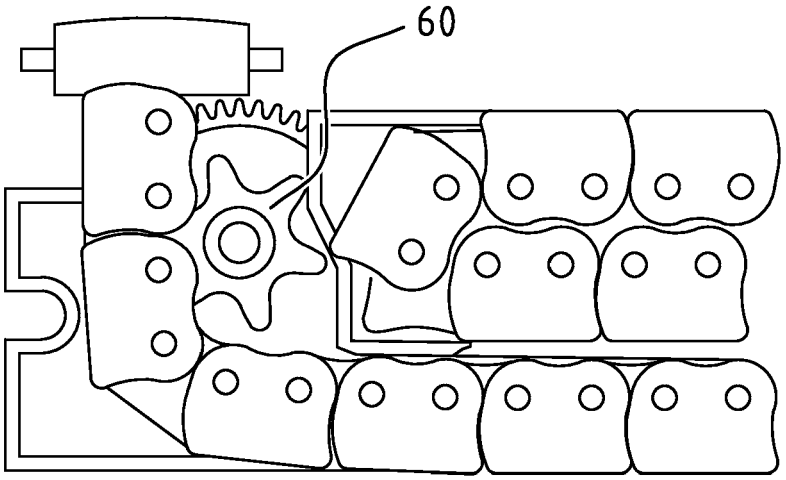


FIG. 4B