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(72) Inventors:
• **PAPARELLA, Rossana**
I-35122 PADOVA (IT)
• **CAINI, Mauro**
I-35122 PADOVA (IT)
• **BRUGNARO, Giovanni**
I-35122 PADOVA (IT)

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(74) Representative: **Busana, Omar**
Jacobacci & Partners S.p.A.
Piazza Mario Saggini, 2
35131 Padova (IT)

(71) Applicant: **Universita' Degli Studi Di Padova**
35122 Padova (IT)

(54) **MODULAR SHIELDING APPARATUS FOR BUILDING FACADES**

(57) A modular shielding apparatus (12) for building facades (14) comprises: at least one barrier (16) movable between an open position and a closed position; a support structure (18) for said at least one barrier (16), adapted to be fixed to a building facade (14); at least one sliding guide (20; 22) for said barrier (16); and movement means (24) adapted to move said barrier (16) along a sliding direction (x) on said at least one sliding guide (20; 22) between said open position and said closed position. The at least one barrier (16) comprises at least one barrier element (26; 28) comprising a first panel (262; 282) and a second panel (264; 284). The first and second panels (262, 264; 282, 284) are connected to each other at adjacent edges by hinge means (30; 32) defining a hinge axis (302, 322). The first and second panels (262, 264; 282, 284) are adapted to rotate relative to one another about the hinge axis (302, 322). The first panel (262, 282) is rotatably connected to the support structure (18), and the second panel (264; 284) is provided with sliding means (268, 288) which are adapted to slide with respect to the at least one sliding guide (20; 22) and adapted to allow a relative rotation between the at least one sliding guide (20; 22) and the second panel (264, 284). When the barrier is in the closed position, the first and the second panel (262, 264; 282, 284) have lying planes inclined with respect to one another and with respect to the direction defined by the sliding guide (20; 22), and protrude in the opposite direction with respect to the building facade (14).

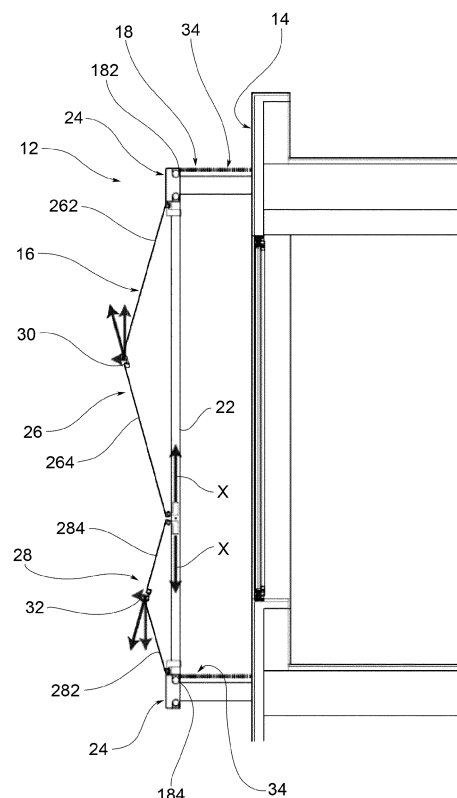


FIG.1

Description

FIELD OF APPLICATION

[0001] The present invention relates to a modular shielding apparatus for building facades. In particular, the present invention relates to shielding apparatuses which are installed externally onto surfaces which are windowed at least in part.

PRIOR ART

[0002] As is known, there are numerous technologies in the prior art which are intended to improve the energy performance of buildings. The sector for shieldings installed externally onto windowed surfaces is particularly important from this point of view.

[0003] For example, zenith sunshade devices of passive type are known, i.e. fixed, producing portions of shade toward the spaces therebelow (when the sun is in an apparent high position in the sky), and are made of slat or plate elements (having different material compositions, for example, made of concrete, wood, metal, and glass) that are inclined along a predetermined angle. This type of device is adapted to intercept incident solar radiation during periods of high temperature, instead allowing the solar radiation to be transmitted during periods of reduced temperature.

[0004] Vertical and horizontal sunshade devices, again passive, are also known which produce portions of shade toward parallel internal spaces, in a position that is inclined with respect to the prevailing solar angle α of the environment. Devices of this kind are made of slat or pre-oriented vane elements (having different material compositions, for example, made of wood, metal and glass) that are applied vertically and at a mutual distance less than the dimensions of the elements themselves.

[0005] There are also orientable azimuth devices of the active type, which produce portions of shade according to the rotation intended to control the solar radiation with respect to the azimuthal course, thus producing the reflection or refraction toward the internal spaces. These devices are made using vane elements having an ogival cross section (for example made of extruded aluminum) which are applied vertically and actuated using mechanical means (manual or motorized).

[0006] Orientable vane sunshade devices of the active type are also known which produce portions of shade according to the rotation intended to control the solar radiation by means of implementation horizontally and parallel with respect to the windowed surfaces, thus producing the reflection or refraction toward the internal spaces. These sunshade devices are composed of vane elements having ogival or wing cross sections (having different material compositions, for example, made of sheet metals, extruded aluminum, wood and glass) that are applied horizontally and actuated using mechanical

means (manual or motorized).

[0007] Again, active sunshade devices having orientable plates are known, which produce portions of shade according to the rotation intended to control the solar radiation with respect to any solar angle, composed of plate elements that are arranged horizontally and actuated using mechanical means (manual or motorized), with the possibility of being able to pack away into the upper position.

[0008] Moreover, there are also blinds which may be packed away, also defined as folding blinds or folding shutters, which are made using contiguous segments connected by hinges, and composed of opaque or perforated panels (made of metal, for example of a stretched steel sheet). These blinds may be packed away using mechanical motorized means, by lifting or lateral dragging, by means of a drive system inserted into the guide profiles. The movement occurs along vertical guides that are parallel to the facade plane and provide regulation of the solar radiation by means of the lifting system.

[0009] There are also sliding blinds, of active type, made using sliding panels and frames for supporting a filtering fabric (in fixed or adjustable metal plates, having different material compositions, for example of aluminum, stretched wire netting, metal fabric, perforated sheet metal, wood), with different opening factors, with the possibility of sliding (using mechanical or motorized means) inside the guide profiles.

[0010] Moreover, there are roller screens (of the active type) which produce portions of shade toward the parallel internal spaces by means of elements composed of cloths of different material compositions, for example in textile, plastics or metal form, which may be actuated by means of guides in hollows or in steel splints, or by means of mounted profiles, with or without a box. The consistency thereof determines the opaque, blackout or filtering formulation.

[0011] There are also the well-known awnings, which are divided into: drop arm awnings, folding arm awnings, hood awnings and veranda awnings.

[0012] While widely appreciated, the prior art is not exempt from disadvantages.

[0013] In fact, while it is known that the presence of solar screens significantly contributes to improving energy efficiency, the use of these screens is still a long way from being deemed efficient, due to issues of both suitable design and control and optimization of the movements with respect to obtaining expected results.

PRESENTATION OF THE INVENTION

[0014] There is therefore a need to resolve the disadvantages and limitations mentioned with reference to the prior art.

[0015] There is thus a need to provide a modular shielding apparatus which may be used in modules and which is therefore adaptable to the dimensions of the particular building facade.

[0016] Moreover, one aim would be to provide a system which, with few modifications to the components, may be used on and adapted to facades having different dimensions.

[0017] Further, it would like to have available a modular shielding apparatus which may be used both for a single transparent opening, for example a window, or for entire building facades.

[0018] Moreover, it would like to have available a modular shielding apparatus which may be easily personalized.

[0019] These requirements are satisfied by a modular shielding apparatus for building facades according to claim 1.

DESCRIPTION OF THE FIGURES

[0020] Further features and advantages of the present invention will become clearer from the following detailed description of preferred non-limiting embodiments thereof, in which:

- Fig. 1 schematically shows a lateral view of a modular shielding apparatus according to the present invention, in a first configuration of use;
- Fig. 2 schematically shows a lateral view of a modular shielding apparatus according to the present invention, in a second configuration of use;
- Fig. 3 schematically shows a front view of a modular shielding apparatus according to the present invention;
- Fig. 4 schematically shows a cross-sectional view of an enlarged portion of a modular shielding apparatus according to the present invention; and
- Fig. 5 schematically shows a cross-sectional view of an enlarged portion of a modular shielding apparatus according to the present invention.

[0021] Elements or parts of elements common to the embodiments described in the following will be provided with the same reference signs.

DETAILED DESCRIPTION

[0022] In Fig. 1, reference sign 12 denotes a modular shielding apparatus for building facades 14.

[0023] The apparatus 12 comprises:

- at least one barrier 16 which is movable between an open position and a closed position;
- a support structure 18 for the at least one barrier 16, adapted to be fixed to a building facade 14;
- at least one sliding guide 20; 22 for the barrier 16; and
- movement means 24 adapted to move the barrier 16 along a sliding direction (x) on the at least one sliding guide 20; 22 between the open position and the closed position.

[0024] The at least one barrier 16 comprises at least one barrier element 26; 28 comprising a first panel 262; 282 and a second panel 264; 284.

[0025] The first and second panels 262, 264; 282, 284 are connected to one another at adjacent edges by hinge means 30; 32 defining a hinge axis 302, 322. The first and second panels 262, 264; 282, 284 are adapted to rotate relative to one another about the hinge axis 302, 322.

[0026] The first panel 262, 282 is rotatably connected to the support structure 18.

[0027] The second panel 264; 284 is provided with sliding means 268, 288 adapted to slide with respect to the at least one sliding guide 20; 22 and adapted to allow a relative rotation between the at least one sliding guide 20, 22 and the second panel 264, 284.

[0028] When the barrier is in the closed position, the first and second panels 262, 264; 282, 284 have lying planes inclined with respect to one another and with respect to the direction defined by the sliding guide 20; 22, and protrude in the opposite direction with respect to the building facade 14.

[0029] According to a possible embodiment, the barrier 16 may comprise a first barrier element 26 and a second barrier element 28. When the barrier 16 is in the closed position, the first barrier element 26 and the second barrier element 28 may be adjacent to one another.

[0030] As can be seen in Fig. 1 and 2, the first barrier element 26 may be provided with a first panel 262 rotatably connected to an upper portion 182 of the support structure 18, and the second barrier element 28 may be provided with a second panel 284 rotatably connected to a lower portion 184 of the support structure 18.

[0031] As can be seen in Fig. 1, when the barrier 16 is in the closed position, the first barrier element 26 may constitute about two-thirds of the barrier 16, and the second barrier element 28 may constitute about one-third of the barrier 16.

[0032] According to a possible embodiment, the first and second panels 262, 282; 282, 284 may have a width of between 900 and 1100 mm, preferably around 1050 mm.

[0033] Possible dimensions for the height of the panels which make up the barrier of the modular shielding apparatus are outlined below by way of example:

- first panel 262 of the first barrier element 26: approximately 1265 mm;
- second panel 264 of the first barrier element 26: approximately 1235 mm;
- first panel 282 of the second barrier element 28: approximately 622 mm; and
- second panel 284 of the second barrier element 28: approximately 592 mm.

[0034] In alternative embodiments, the panels could have other shapes besides rectangular, for example parallelepiped.

[0035] The movement of the first barrier element 26 is the opposite with respect to the movement of the second barrier element 28: the first barrier element packs away upwards and the second barrier element packs away downwards. In so doing, the contact point between the two barrier elements is at the same height as that of the average field of view of people who are standing. This particular feature means that, when the system begins to open, the occupants of the premises may see outside through the transparent surfaces. Therefore, even when the barrier is nearly closed, it is possible to see outside and take advantage of natural illumination while avoiding glare and reducing the energy loads on the transparent surfaces of the casing.

[0036] According to one possible embodiment, when the barrier 16 is in the closed position, the first and second panels 262, 264; 282, 284 have lying planes inclined with respect to one another by an angle comprised between 130° and 160°. Advantageously, when the barrier 16 is in the closed position, the first and second panels 262, 264; 282, 284 may have lying planes inclined with respect to one another by an angle of approximately 144°.

[0037] In the preferred embodiment, the panels may vary their position by approximately 68°. In fact, in the closed position, the panels form an angle of approximately 18° with respect to the plane of the facade, with the possibility of forming an angle of 86° when in the maximum opened position. In so doing, the demand for electrical power from the motor in order to start the movement of the shielding panels, both in an opening phase and closing phase of the barrier, is lower with respect to a starting position which is perfectly vertical or horizontal. In fact, the force applied by the motor is split into two force components, with the horizontal force component guaranteeing ease of movement of the shielding panels in order to be packed away.

[0038] As well as a functional value, the particular positioning of the panels of the barrier also has positive consequences from an architectural point of view. When the barrier is in the closed position, the apparatus creates dynamism on the facade and may assume a key role in the architectural expressivity of the building.

[0039] According to one possible embodiment, the apparatus may comprise two sliding guides 20, 22: namely a left sliding guide 20 and a right sliding guide 22 placed at the sides of the barrier 16.

[0040] The at least one sliding guide 20, 22 may be fixed to the building facade 14 by means of the support structure 18 or in an independent manner.

[0041] According to one possible embodiment, the at least one sliding guide 20, 22 may be arranged parallel to the building facade plane 14.

[0042] In alternative embodiments, the at least one sliding guide 20, 22 may be arranged so as to have lying planes inclined with respect to the building facade plane 14.

[0043] Fig. 4 is a schematic view of a possible embodiment of the assembly, comprising the sliding guides 20,

22, the movement means 24, and the sliding means 268, 288.

[0044] The sliding guides 20, 22 may be an extruded aluminum profile having a substantially C-shaped cross section which has an opening facing the edge of the relevant panel 264 (with reference to the portion shown in the figure).

[0045] According to one possible embodiment, two sliding tracks 36, 38 may be provided on the inside of the C. The sliding tracks 36, 38 extend in parallel with one another and are adapted to allow two runners 40, 42 of the sliding means 268, 288 to slide. The sliding tracks 36, 38 may be substantially C-shaped and adapted to contain the runners 40, 42. The sliding tracks 36, 38 may be adapted to limit or prevent the movements and rotations of the plane transverse to the relevant sliding tracks 36, 38, thereby allowing translation in a direction perpendicular to the cross section.

[0046] According to a possible embodiment, the sliding means 268, 288 comprise a substantially C-shaped support 44 on which the runners 40, 42 are provided on the internal surfaces of the arms. Connecting elements 46, 48 are provided on the external surfaces of the arms in order to connect to a belt 50, 52.

[0047] According to a possible embodiment, the belt is connected to the connecting element and is moved by means of the movement means 24.

[0048] According to a possible embodiment, the connecting joint 56, 58 which allows the panel to rotate with respect to the support 44 may be provided on the support 44.

[0049] Therefore, according to a possible embodiment, the runners which are connected to the motor by belts, and which move the solar shielding, slide inside the extruded profile. This extruded guide profile is dimensioned, by resistant cross section, according to the height necessary to be shielded and according to the stresses to which it is subjected (wind pressure, material deformations, load variations of the system itself with variation of the solar shielding panel, etc.).

[0050] According to a possible embodiment, two brush faces 60, 62 may be positioned on the extrusion of the guide so as to allow the movement joint of the shielding panel to slide without friction. Moreover, these brush faces may also serve esthetic purposes of closing the open part of the cross section.

[0051] The bolts of the brackets also have a cover 66 made of aluminum to esthetically close the mechanical fastener 64 with the support 18 for anchoring to the structure of the building facade. The connecting joint 56, 58 may be hooked onto the frame of the panel 264, 284 which may consist of an aluminum profile having a square cross section.

[0052] The first panel 262, 282 and the second panel 264, 284 may be micro-perforated.

[0053] The microperforation may consist of holes which have different geometric designs.

[0054] According to one possible embodiment, the per-

forated surface, with perforated surface being intended to mean the total of the surface area of the microholes, may be between 10% and 40% of the surface of the panel. The perforated surface may advantageously be between 15% and 33% of the surface of the panel.

[0055] The percentage of perforated surface may be dependent on the luminosity conditions of the geographical location where the panel may be used, so as to allow the natural light required for activities inside a building to pass through, even when the panel is in the closed position.

[0056] According to one possible embodiment, the first panel 262, 282 and the second panel 264, 284 may be made of aluminum or an alloy thereof.

[0057] In alternative embodiments, the first panel 262, 282 and the second panel 264, 284 may be made of wire netting, panes of transparent or colored glass, etc.

[0058] According to a possible embodiment, the support structure 18 for the at least one barrier 16 may be adapted to position the barrier at a minimum distance from the building facade 14 of between 40 cm and 80 cm. The support structure 18 for the at least one barrier 16 may advantageously be adapted to position the barrier at a minimum distance from the building facade 14 of between 55 cm and 65 cm, preferably at a distance of approximately 60 cm.

[0059] The distance between the shielding system and the external casing also allows air which heats up to rise upwards, significantly reducing the free solar gain and therefore the thermal load acting on the glass surfaces.

[0060] According to a possible embodiment, the modular shielding apparatus 12 may comprise a treadable maintenance grid 34, which is provided on the support structure 18 so that it protrudes towards the facade plane 14.

[0061] The modular shielding apparatus 12 may also comprise a programmable control unit for controlling the opening status of the barrier.

[0062] According to one possible embodiment, the movement means 24 may comprise a motorization means, for example a 230-V electric motor.

[0063] The electric motor may be provided with an incremental encoder adapted to measure the rotation carried out by the electric motor.

[0064] The motorization means may advantageously be arranged on the support structure 18.

[0065] For example, the incremental encoder may use photoswitches adapted to read the number of pulses. It is possible to measure the rotation by counting the pulses and identifying the number of radial lines present on the disc. The electrical pulses thus generated may be used to control the mechanical movements which generated said pulses and the corresponding speed of movement.

[0066] The encoder may advantageously use the detection of the angular movement together with the principle of photoelectric scanning. It is known that, in an optical rotary encoder, the reading system is based on the rotation of a disc graduated with a radial reticle formed

by opaque lines alternating with transparent spaces. The disc is illuminated perpendicularly by an infrared light source. The disc thus projects its image onto the surface of various receivers, which are suitably masked by a further reticle having the same pitch as the previous collimator. The receivers are tasked with detecting the light variations which occur with the movement of the disc, converting them into corresponding electrical variations.

[0067] The resulting electrical signal is used to generate pulses which are correctly squared and interference-free, and has to be processed electronically. In order to increase the quality and stability of the signals, the reading may be carried out in a differential manner, by comparing two signals which are almost identical but out of phase by 180 electrical degrees. The reading is carried out on the basis of the difference between the two signals, thus eliminating any interference which is defined as "common" because it is superimposed equally on every waveform.

[0068] The incremental encoder provides two waveforms which are squared and out of phase by 90 electrical degrees, which waveforms are called channel A and channel B. Information relating to the rotational speed is obtained by reading just one single channel, whereas, by also acquiring signal B, it is possible to discriminate the direction of rotation based on the sequence of states produced by the two signals. It is also possible to provide a further signal which is known as channel Z or channel zero, which provides an absolute zero position of the encoder tree. This signal is presented in the form of a squared pulse with phasing and width centered on channel A.

[0069] Therefore, by using an electric motor coupled to an encoder, it is possible, by means of the programmable control unit, to send precise commands in order to be able to move the modular shielding apparatus in an optimal manner, thereby reducing the possibility of error and limiting the costs of the control componentry.

[0070] According to a possible embodiment, the programmable control unit is programmed to autonomously operate the opening and closing, even partial, of the barrier 16. For this purpose, the apparatus may comprise sensor devices (not shown in the accompanying figures) which are connected to the programmable control unit.

[0071] The sensors may advantageously comprise sensors adapted to measure:

- the internal or external temperature of the building,
- the level of internal illumination, and
- the presence of people inside the premises.

[0072] According to a possible embodiment, the internal temperature sensor may be a wireless photosensor installed in the environment. The external temperature sensor may be a wireless sensor, for example. The presence sensor may also be a wireless sensor.

[0073] The apparatus may also comprise means for controlling the artificial light. The means for controlling

the artificial light may also be, for example:

- an on/off switch; and
- a modbus dimmer for automatically controlling the luminous intensity of the illumination devices.

[0074] The programmable control unit is adapted to receive the signals from the sensors and is therefore adapted to control the movement of the barrier by means of the movement means which are connected to the encoder.

[0075] Moreover, the illumination devices may be automatically switched on based on the effective occupation of the environment that is detected by the presence/occupation sensor. Switching off may however be automatic, for example after 5 minutes of inactivity from the presence sensors.

[0076] Switching the devices on and off, however, may occur manually at any time by means of the standard switches installed on the walls.

[0077] According to a possible embodiment, the programmable control unit also makes it possible to set the working hours of a typical week and to decide that the illumination devices and the control thereof are operational from Monday to Friday according to the working hours. When there is a need to illuminate the environment outside working hours or during a holiday period, it is also possible to switch on the system using manual means.

[0078] The photosensor installed in the environment may record the level of illumination at specific points of interest inside the premises. The value recorded may be analyzed by the programmable control unit which sends the command to the modbus dimmer to automatically regulate the artificial illumination devices based on the availability of natural light in the environment.

[0079] The dimmer may advantageously be adapted to automatically switch off the illumination assembly when the fraction of electrical power emitted is less than 30% of the total and the fraction of light emitted is less than 20%. This means that the natural illumination only guarantees the minimum level of illumination required.

[0080] The temperature sensor located near the premises and the window openings may be adapted to read, at regular intervals, the temperature value outside the building. This value is sent to the programmable control unit which records it. If the external temperature exceeds a defined set-point limit temperature, which depends on the weather conditions of the location and was evaluated during preliminary analysis so as to reduce consumption for cooling the environment, the management and control system activates the shielding apparatus.

[0081] According to a possible embodiment, when the control unit activates the solar shielding, a message containing the command of when to open or close the barrier elements is sent to the motorization means comprising an encoder which regulates the movement of the barrier.

[0082] Since the motor used is provided with an incre-

mental encoder, the control unit sends the message to said encoder in the form of a number of pulses that the photosensors have to read. This number of pulses corresponds to an angle of rotation of the motor, which translates in turn to a vertical movement of the mobile joints of the shielding system. By identifying the location, the day and the time where the system is installed, and implementing in the control software data relating to the position of the sun during the various hours of the day for the entire year, it is possible to identify the exact position of the sun at any given time. The control system may therefore activate the solar shields, placing the panels orthogonally with respect to the direction of the solar rays.

[0083] During mounting, the apparatus may arrive on site with the guides and mechanical componentry already installed. The modularity allows the profiles to be easily hooked onto the horizontal supports provided. This thereby guarantees simplicity of mounting, a reduction in the time and costs for construction, total reversibility of the system, and simplicity of maintenance.

[0084] A modular shielding apparatus has therefore been provided which may be used in modules and is therefore adaptable to the dimensions of the particular building facade.

[0085] Moreover, a shielding apparatus has been provided which, with few modifications to the components, may be used on and adapted to facades having different dimensions.

[0086] Finally, a modular shielding apparatus has been provided which may be used both for a single transparent opening, such as a window, and for entire building facades.

[0087] A person skilled in the art will be able to make modifications to the embodiments described above or substitute described elements with equivalent elements, in order to satisfy particular requirements, without departing from the scope of the accompanying claims.

Claims

1. A modular shielding apparatus (12) for building facades (14), comprising:

- at least one barrier (16) movable between an open position and a closed position;
- a support structure (18) for said at least one barrier (16), adapted to be fixed to a building facade (14);
- at least one sliding guide (20; 22) for said barrier (16); and
- movement means (24) adapted to move said barrier (16) along a sliding direction (x) on said at least one sliding guide (20; 22) between said open position and said closed position;

characterized in that said at least one barrier (16)

- comprises at least one barrier element (26; 28) comprising a first panel (262; 282) and a second panel (264; 284);
 said first and second panels (262, 264; 282, 284) being connected to each other at adjacent edges by hinge means (30; 32) defining a hinge axis (302, 322), said first and second panels (262, 264; 282, 284) being adapted to rotate relative to each other about said hinge axis (302, 322);
 said first panel (262, 282) being rotatably connected to the support structure (18), and said second panel (264; 284) being provided with sliding means (268, 288) adapted to slide with respect to said at least one sliding guide (20; 22), and adapted to allow a relative rotation between said at least one sliding guide (20, 22) and said second panel (264, 284);
 in said closed position of said barrier, said first and second panels (262, 264; 282, 284) having lying planes inclined with respect to one another and to the direction defined by said sliding guide (20; 22), protruding in the opposite direction with respect to said building facade (14).
2. Modular shielding apparatus (12) according to claim 1, **characterized in that** said at least one barrier (16) comprises a first barrier element (26) and a second barrier element (28), said first barrier element (26) and said second barrier element (28), in the closed position of the barrier (16), being adjacent to each other.
 3. Modular shielding apparatus (12) according to the preceding claim 2, **characterized in that** said first barrier element (26) is provided with a first panel (262) rotatably connected to an upper portion (182) of the support structure (18), and said second barrier element (28) is provided with a second panel (284) rotatably connected to a lower portion (184) of the support structure (18).
 4. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** in the closed position of the barrier (16), said first barrier element (26) constitutes about two-thirds of the barrier (16), and said second barrier element (28) constitutes about one-third of the barrier (16).
 5. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** in the closed position of the barrier (16) said first and second panels (262, 264; 282, 284) have lying planes inclined with respect to one another by an angle comprised between 130° and 160°.
 6. Modular shielding apparatus (12) according to any one of claims 1-5, **characterized in that** in the closed position of the barrier (16) said first and second panels (262, 264; 282, 284) have lying planes inclined with respect to one another by an angle of around 144°.
 7. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized by** comprising two sliding guides (20, 22), a left sliding guide (20) and a right sliding guide (22) placed at the sides of the barrier (16).
 8. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** said at least one sliding guide (20, 22) is parallel to the building facade plane (14).
 9. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** the perforated surface of said first panel (262, 282) and said second panel (264, 284) is between 15% and 33% of the surface of the panel.
 10. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** said first panel (262, 282) and said second panel (264, 284) are made of aluminum or an alloy thereof.
 11. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** said support structure (18) for said at least one barrier (16) is adapted to position said barrier at a minimum distance from said building facade (14) of between 40 cm and 80 cm.
 12. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized in that** said support structure (18) for said at least one barrier (16) is adapted to position said barrier at a minimum distance from said building facade (14) of between 55 cm and 65 cm.
 13. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized by** comprising a treadable maintenance grid (34), provided on said support structure (18) so that it protrudes towards said facade plane (14).
 14. Modular shielding apparatus (12) according to any one of the preceding claims, **characterized by** comprising a programmable control unit for controlling the opening status of said barrier.

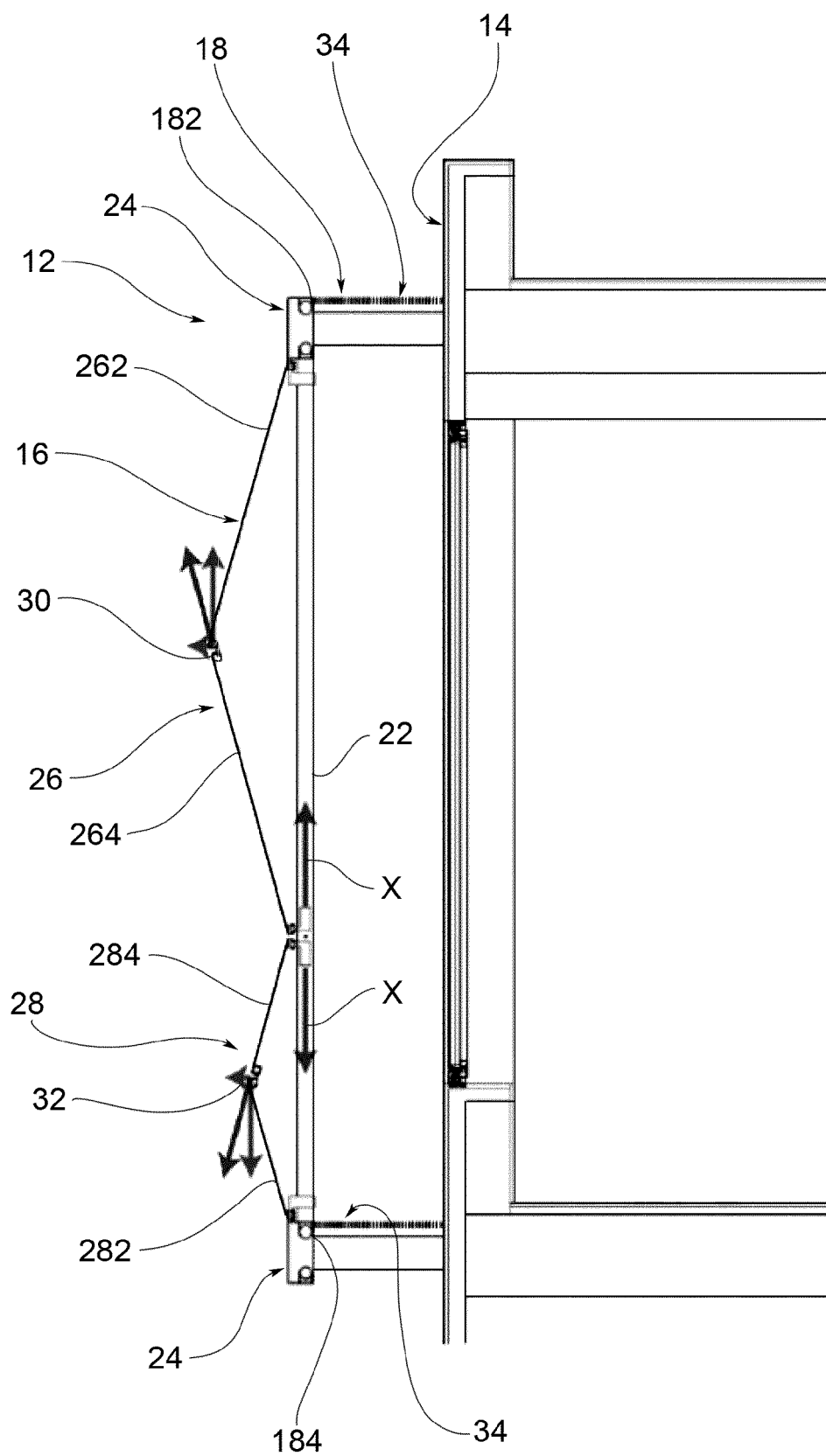


FIG.1

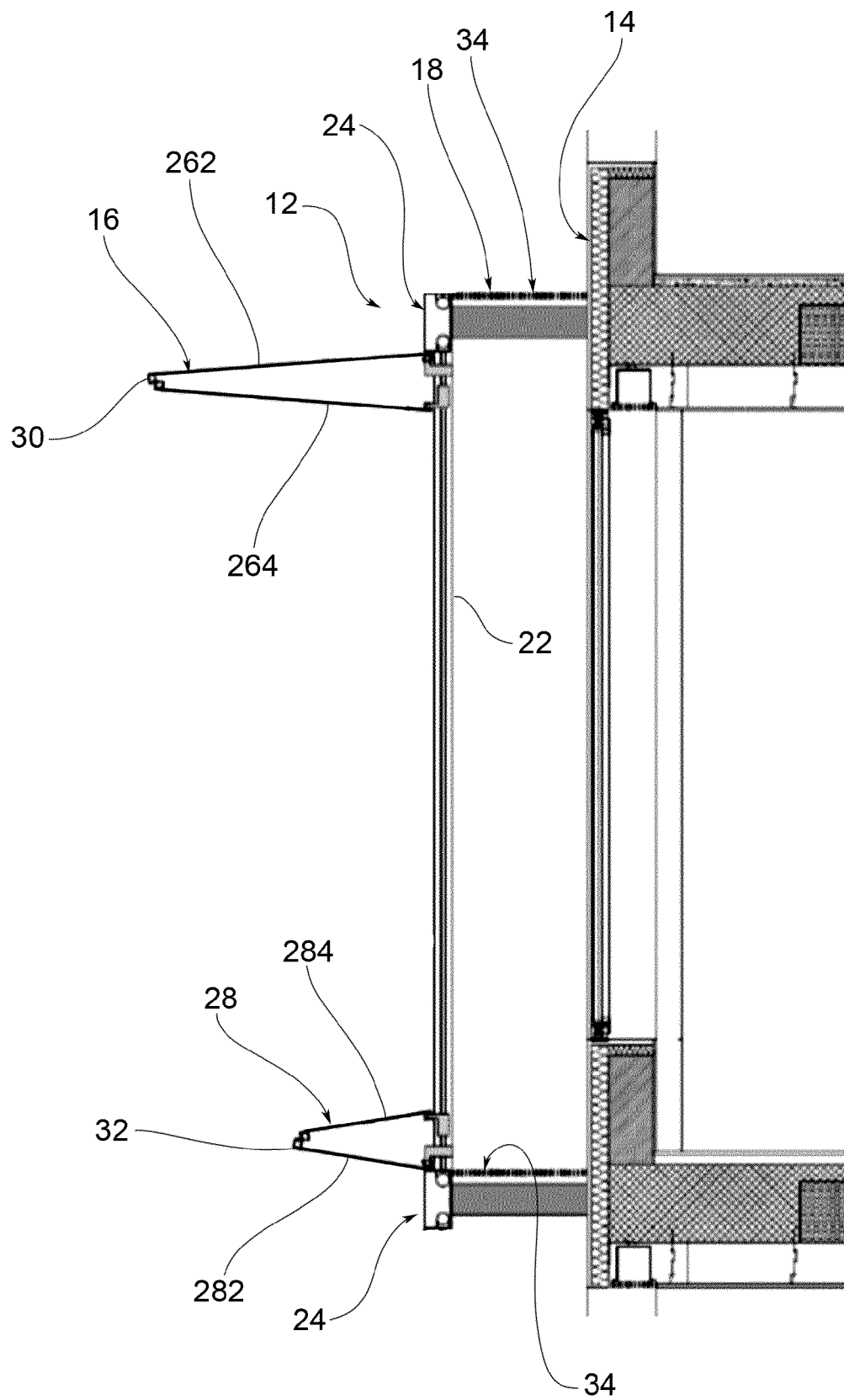


FIG.2

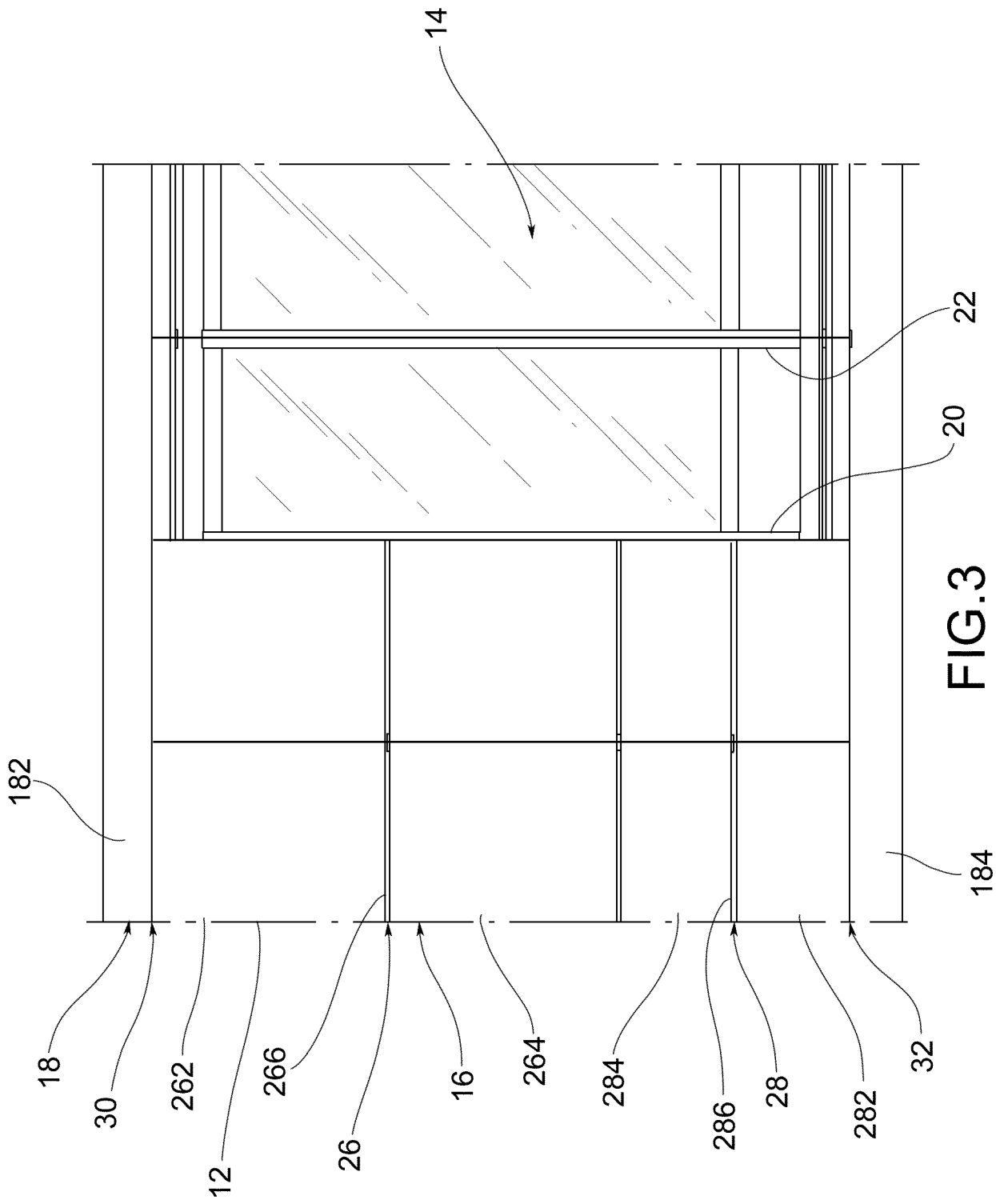
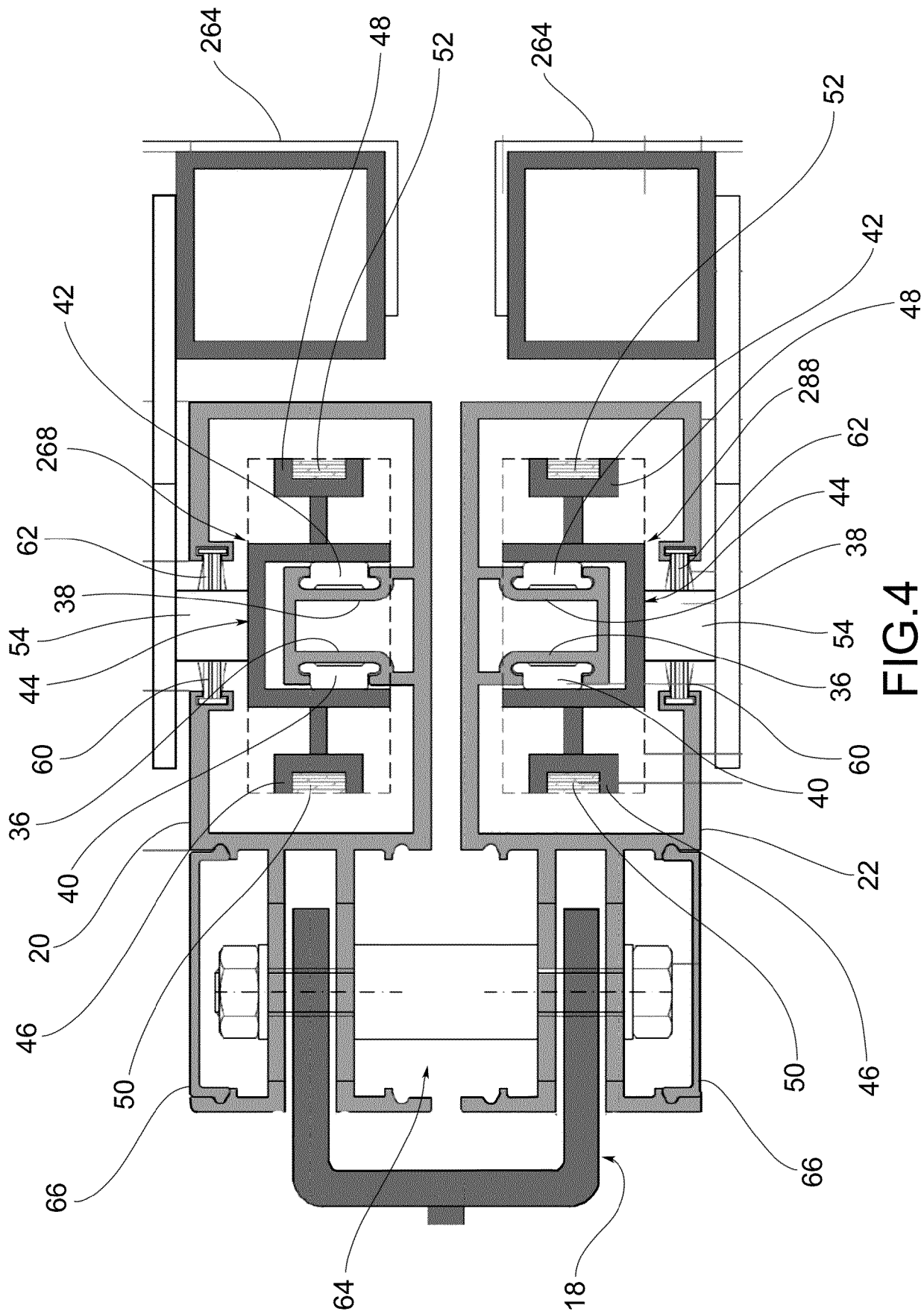


FIG. 3



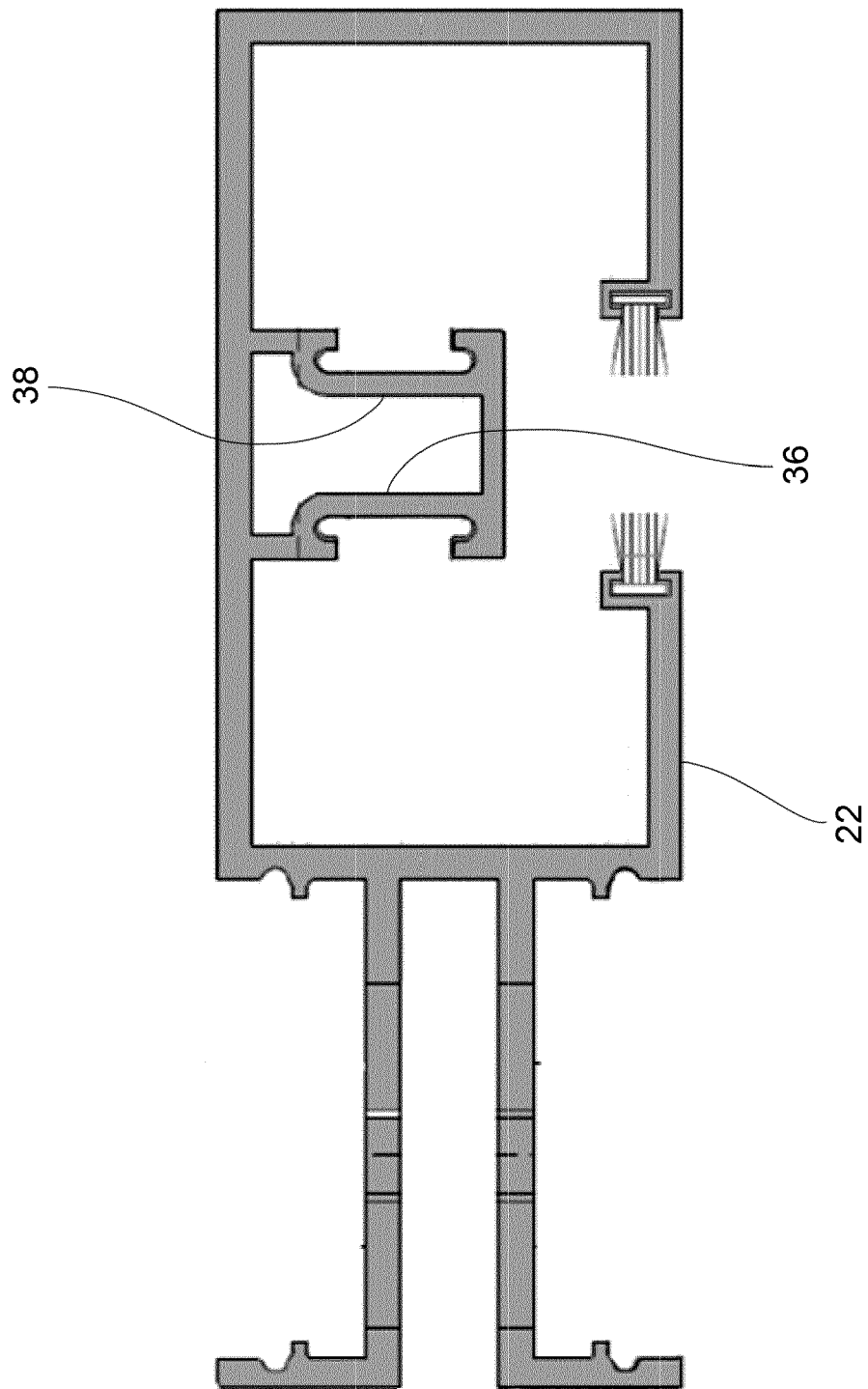


FIG.5



EUROPEAN SEARCH REPORT

Application Number
EP 20 17 6154

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 September 2020	Examiner Tänzler, Ansgar
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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