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

(11) EP 1 052 364 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.11.2000 Bulletin 2000/46

(51) Int Cl.[7]: **E06B 9/24**, E06B 9/40, G09F 13/04

(21) Application number: **00110135.1**

(22) Date of filing: **11.05.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **14.05.1999 IT MI991067**

(71) Applicants:
- **Tassoni, Luigi**
  20129 Milano (IT)
- **Pesenti, Marcella**
  20080 Ablairate (Milano) (IT)

(72) Inventors:
- **Tassoni, Luigi**
  20129 Milano (IT)
- **Pesenti, Marcella**
  20080 Ablairate (Milano) (IT)

(74) Representative: **Modiano, Guido, Dr.-Ing. et al**
Modiano & Associati SpA
Via Meravigli, 16
20123 Milano (IT)

(54) Window with built-in lighting means

(57) A window with built-in light, comprising at least one glass pane (6). which is accommodated within a movable sash (1) which is adapted to be hinged to a fixed casing (2), further comprising at least one light source (7) which is meant to be accommodated in the sash or casing and to project light rays toward the at least one glass pane.

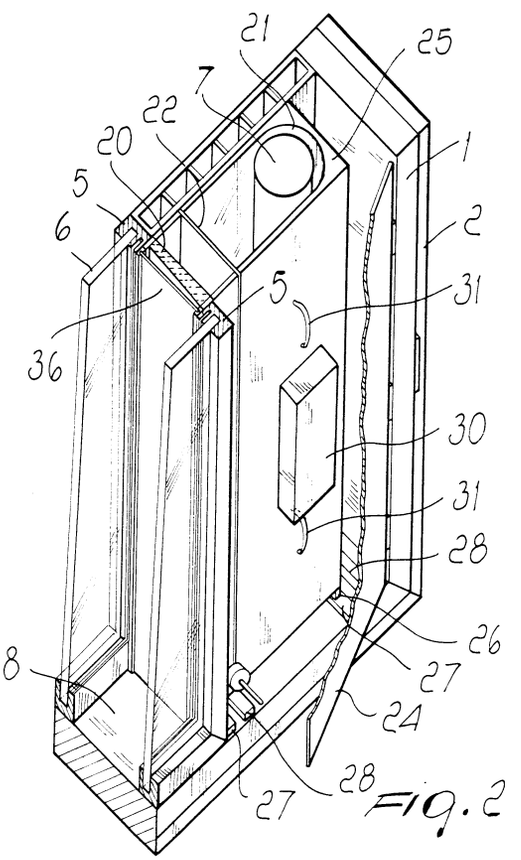

Fig. 2

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Description

[0001] The present invention relates to a window with built-in lighting means. More particularly, the invention relates to a window which is capable of emitting light of its own independently of the light that is present outside the building in which the window is installed.

[0002] It is known that the use of windows allows to light enclosed spaces occupied by people, the lighting being directly proportional to the amount of light that is present outside the building in which the window is installed.

[0003] However, the external lighting conditions are often not sufficient to adequately light the internal enclosed space. Alternatively, regardless of the need to light internally the enclosed space that one is occupying, one wishes to have additional lighting with respect to the artificial lighting that is normally used.

[0004] Such additional lighting can allow to make the space more pleasant, improving the comfort of its occupiers.

[0005] However, conventional windows are unable to offer such additional lighting, especially in case of particular external atmospheric conditions, in which natural lighting is not available.

[0006] Moreover, for example in the case of Nordic countries, in which sunlight is scarce or completely absent for a significant part of the year, the use of conventional windows does not provide the expected results, since internal enclosed spaces do not benefit from the light that might enter through the windows.

[0007] This can entail discomfort, also of a psychological kind, of the occupiers, without the windows being able to have an active role in their favor.

[0008] The aim of the present invention is to provide a window with built-in lighting means which allows to achieve an effective lighting effect as well as a pleasant aesthetic effect.

[0009] Within the scope of this aim, an object of the present invention is to provide a window with built-in lighting means which can be used as a screen for projecting images chosen by the users.

[0010] Another object of the present invention is to provide a window with built-in lighting means which can be used equally as a conventional window or as a "lighted" window without having to radically change the structure of the window.

[0011] Another object of the present invention is to provide a window with built-in lighting means in which the framework of the window is not substantially modified with respect to conventional windows and therefore does not alter the aesthetic impact of the window.

[0012] Another object of the present invention is to provide a window with built-in lighting means whose opening is similar to that of a conventional window.

[0013] Another object of the present invention is to provide a window with built-in lighting means which is highly reliable, relatively easy to manufacture and at competitive costs.

[0014] This aim, these objects and others which will become better apparent hereinafter are achieved by a window with built-in light, comprising at least one glass pane which is accommodated within a movable sash which is suitable to be hinged to a fixed casing, characterized in that it further comprises at least one light source which is meant to be accommodated in said sash or casing and to project light rays toward said at least one glass pane.

[0015] Further characteristics and advantages of the invention will become better apparent from the description of preferred but not exclusive embodiments of the window according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a front elevation view of the window according to the present invention;
Figure 2 is a perspective view of the detail of the sash of the window according to the present invention;
Figure 3 is a sectional view of the window according to the present invention;
Figure 4 is a sectional view, taken along a vertical plane, of the window according to the invention;
Figure 5 is a perspective view of a detail of the window according to the invention; and
Figure 6 is a schematic view of the light deflection principle used in the window according to the present invention.

[0016] With reference to the above-cited figures, the window according to the present invention comprises a movable sash 1 which is meant to be hinged to a fixed casing 2 of a conventional type. The movable sash 1 surrounds, at a side that is meant to be hinged to the fixed casing 2, a portion 3 for accommodating at least one light source, as described in detail hereinafter. In an upward region, instead, the movable sash 1 surrounds a case which is suitable to accommodate at least one roller which is adapted to unroll and roll up at least one optical film whose function will be explained in detail hereinafter.

[0017] The window according to the invention further has an internal frame 5 for retaining at least one glass pane 6 of a conventional type.

[0018] The particularity of the invention resides in the fact that the window has at least one light source, designated by the reference numeral 7, which is accommodated within the portion 3 and is adapted to send light rays parallel to the surface of the glass pane, so as to produce built-in lighting for the window.

[0019] In particular, the window comprises at least one glass pane 6 and at least one light source 7 which is adapted to project light parallel to the glass pane 6. The case 4 contains at least one roller for unrolling a panel which is meant to be substantially in contact with

the glass pane 6, so that the light emitted by the light source 7 is not scattered outside the enclosed space in which the window is applied.

[0020] Preferably, however, the window according to the invention has two glass panes 6 which are arranged parallel to each other so as to form, between them, a gap 8, as normally occurs in a common double-glazing unit. The light source 7 thus projects light into the gap between the two glass panes 6, and conveniently there are two panels (optical films) which are unrolled from two rollers 10 and 11 accommodated in the case 4 arranged in the upper portion of the window.

[0021] The two panels, designated by the reference numerals 12 and 13 respectively, are constituted by optical films: one film 13 is meant to be arranged adjacent to the outer glass pane 6 and is conveniently constituted by a material which is adapted to fully reflect the light emitted by the light source. Said material thus behaves like a mirror. On the contrary, the second panel 12 unrolled from the roller 10 and meant to be lowered adjacent to the inner pane 6 is made of light-scattering material, so as to scatter the light introduced by the light source 7 in the gap 8 between the two glass panes 6.

[0022] With reference in greater detail to Figures 4 and 5, the two unwinding rollers of the optical films 12 and 13 are shown; one of said optical films, for example the optical film 12 with the corresponding roller 10, is shown in Figure 5. As clearly shown, a weighting bar 14 is coupled to the end of the optical film 12 in order to keep said film 12 stretched; said film is lowered into a guide 15 which runs parallel to the guide that accommodates the glass pane 6. In this manner, the unrolling of the optical film 12 (the same applies to the optical film 13) occurs in a guided fashion and the optical film is arranged parallel to the glass pane, inside the gap 8 provided between the two inner and outer glass panes 6.

[0023] Figure 5 is a detail view of the connection between the optical film 12 and the weighting bar 14.

[0024] Conveniently, in order to ensure that the light emitted by the light source 7 is directed not only parallel to the glass pane 6 but can be conveniently reflected into the enclosed space in which the window is applied, it is possible to provide optical deflection means, conveniently constituted for example by an optical prism 20 which is shaped so that the light rays emitted by the light source 7 strike the surface of the inner glass pane 6.

[0025] The effect of this prism is clearly indicated in Figures 3 and 6. The light rays emitted by the light source 7 are carried by adopting suitable conveyance means, provided for example by a parabolic mirror 21 arranged so as to wrap around the light source 7 and thus convey onto the prism 20 also the light rays that would otherwise scatter in the opposite direction with respect to the gap 8 provided between the two glass panes 6.

[0026] The optical prism 20 is thus constructed so that the rays that pass through the prism are incident to the optical film 12 that is arranged inside the inner glass pane 6.

[0027] The optical film 12, made of light-scattering material, causes the rays that are incident thereon to be reflected substantially at 90° with respect to the direction of incidence. This entails a diffusion of the light emitted by the light source 7 into the enclosed space, thus meeting one of the objects of the invention.

[0028] Conveniently, it is possible to interpose, between the light source 7 and the optical prism 20, at least one image projection element, which is conveniently constituted for example by a strip 22 which is arranged for example parallel to the movable sash of the window and is arranged substantially so as to face the light source 7.

[0029] The use of the projection strip 22 allows to project chosen images onto the optical film 12, so that said images are visible through the glass plate of the window.

[0030] Figure 2 is a detailed view of the arrangement of the light source 7, of the projection strip 22 and of the prism 20. As clearly shown, the light source is accessed by opening a flap 24 which is provided so as to cover the portion 3 that accommodates the light source 7. In turn, the light source 7 is accommodated in a box-like body 25 which also accommodates the projection strip 22, which is inserted in front of the light source 7 by making it slide with an insertion movement at right angles to the surface of the window.

[0031] Preferably, owing to the need to rapidly access the box-like body 25 and extract it from its seat in the portion 3 of the window, the box-like body is provided with feet 26 which run between pairs of guides 27 and 28, thus allowing to insert and extract the box-like body 25 from the corresponding seat provided between the movable sash 1 of the window and the edges of the glass panes 6.

[0032] Conveniently, the box-like body 5 is internally shaped like a parabolic arc (so as to form said optical conveyance means) and its inner surface is mirror-finished, so as to achieve the effect of reflecting the light rays emitted by the light source 7 toward the projection strip 22 and the prism 20.

[0033] The electrical components are conveniently accommodated in a container 30 on the outer surface of the box-like body 25, which can be accessed by opening the door 24. Two handles 31 are provided for extracting and inserting the box-like body 25 in its seat.

[0034] Conveniently, the door 24 is further provided with a handle 35 of its own for opening the door 24 in order to access the box-like body 25.

[0035] The optical prism 20 delimits the gap region 8 between the two glass panes 6. Conveniently, the prism faces a sheet 36 of transparent material, such as for example Plexiglas; At the opposite end of the window, which faces the sheet 36, there is instead a sheet 37 in which the surface that faces the sheet 36 is of the mirror-finished type.

[0036] Accordingly, when the light source 7 is

switched on the light rays are directed toward the gap 8. The light beam that originates from the light source 7, which is the light beam that lies closest to the outer glass pane 6, is reflected, owing to the presence of the optical prism 20, at the opposite corner of the window, so that the entire surface of the glass pane 6 is affected by the light rays emitted by the light source 7.

[0037] The optical films 12 and 13 allow, when lowered, to convert the window, screening completely the view outside the window and reflecting completely toward the inside of the enclosed space the light rays emitted by the light source 7.

[0038] As mentioned, the strip 22 for projecting light/images can be conveniently provided with patterns and various images, which can thus be projected onto the surface of the glass pane 6 inside the enclosed space.

[0039] The described arrangement of the light source 7 is merely an example, since such light source can be equally arranged in an upper region and in a lower region as well as laterally as shown in the figures.

[0040] As an alternative, it is also possible to provide a projector which is arranged inside the casing of the window and by means of which it is possible to project images directly onto the optical film 12, so that the occupiers of the room to which the window according to the invention is applied can view the projection on the inner pane 6.

[0041] The adoption of light sources 7 with particular colorings allows to obtain aesthetically pleasant effects, for example with eye-resting tones, this being a particularly important factor for example in the case of working spaces.

[0042] The above-described window can be advantageously used for example also in glazed buildings in which the outer surface of the building is provided by means of a framework in which glass panes are arranged adjacent to each other, so as to give the outer surface of the building a continuous reflective finish.

[0043] It is also possible to provide a plurality of light sources which are accommodated in the portion 3 that is closed by the door 4, which is hinged to the movable sash 1, as shown for example in Figure 2.

[0044] In practice it has been observed that the window according to the invention fully achieves the intended aim and objects, since it allows to obtain an indoor lighting according to the user's wishes, regardless of the presence of external sunlight.

[0045] Moreover, the window thus conceived is not substantially modified with respect to a conventional window, since the space for accommodating the box-like body 25 that houses the light source 7 is minimal and does not substantially affect the aesthetics of the window.

[0046] Moreover, the window thus conceived can obviously also be used in the conventional manner, if the user does not wish to switch on the light source and unroll the optical films in contact with the outer and inner glass panes of the window.

[0047] The window thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept. Thus, for example, the light source 7 can be accommodated in the fixed casing 2 substantially in the same manner in which it is accommodated in the movable sash 1.

[0048] Moreover, the window according to the invention can be used not only as a vertical window but also as a horizontal or otherwise angled window and can be advantageously used as an element for separating internal spaces.

[0049] All the details may furthermore be replaced with other technically equivalent elements.

[0050] In practice, the materials used, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0051] The disclosures in Italian Patent Application No. MI99A001067, from which this application claims priority, are incorporated herein by reference.

[0052] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A window with built-in light, comprising at least one glass pane which is accommodated within a movable sash which is suitable to be hinged to a fixed casing, characterized in that it further comprises at least one light source which is meant to be accommodated in said sash or casing and to project light rays toward said at least one glass pane.

2. The window according to claim 1, characterized in that it further comprises at least one optical film which is meant to be arranged parallel to said glass pane and adjacent thereto.

3. The window according to one or more of the preceding claims, characterized in that it comprises two glass panes which are mutually parallel and are adapted to form a gap, said at least one light source being adapted to direct its light rays into said gap.

4. The window according to one or more of the preceding claims, characterized in that it comprises two optical films which are meant to be arranged adjacent to said pair of glass panes, a first one of said optical films being made of reflective material, a second one of said optical films being made of light-scattering material.

5. The window according to claim 4, characterized in that said first optical film is arranged adjacent to the outer glass pane of said pair of panes, said second light-scattering optical film being arranged adjacent to said inner glass pane of the window.

6. The window according to one or more of the preceding claims, characterized in that it has light-deflecting means which are suitable to deflect the light rays emitted by said light source so that said light rays become incident to said inner glass pane of the window.

7. The window according to claim 6, characterized in that said light-deflecting means comprise an optical prism which is arranged so as to face said light source, at the region where said light rays enter said gap.

8. The window according to one or more of the preceding claims, characterized in that an element for projecting light/images is arranged between said at least one light source and said optical prism and lies parallel to said optical prism.

9. The window according to one or more of the preceding claims, characterized in that said at least one light source and said projection element are accommodated in a box-like body which is adapted to be inserted in a portion of the framework of said window, in said sash or casing.

10. The window according to one or more of the preceding claims, characterized in that said box-like body is internally parabolic and made of reflective material in order to reflect the light rays emitted by said light source accommodated within said box-like body.

11. The window according to one or more of the preceding claims, characterized in that it comprises two rollers, each of which is adapted to unroll one of said optical films meant to be lowered adjacent to said inner and outer glass panes.

12. The window according to one or more of the preceding claims, characterized in that said two rollers are accommodated in the upper portion of said window.

13. The window according to one or more of the preceding claims, characterized in that each one of said optical films unrolled from the respective roller is lowered so as to be guided along a guide arranged adjacent to a guide for accommodating said glass pane.

14. The window according to one or more of the preceding claims, characterized in that said box-like body can be inserted and removed, by sliding along a pair of guides, within said portion formed between said movable sash of the window and said glass panes.

15. The window according to one or more of the preceding claims, characterized in that said light source is accommodated in said movable sash.

16. The window according to one or more of the preceding claims, characterized in that said light source is accommodated in said fixed casing.

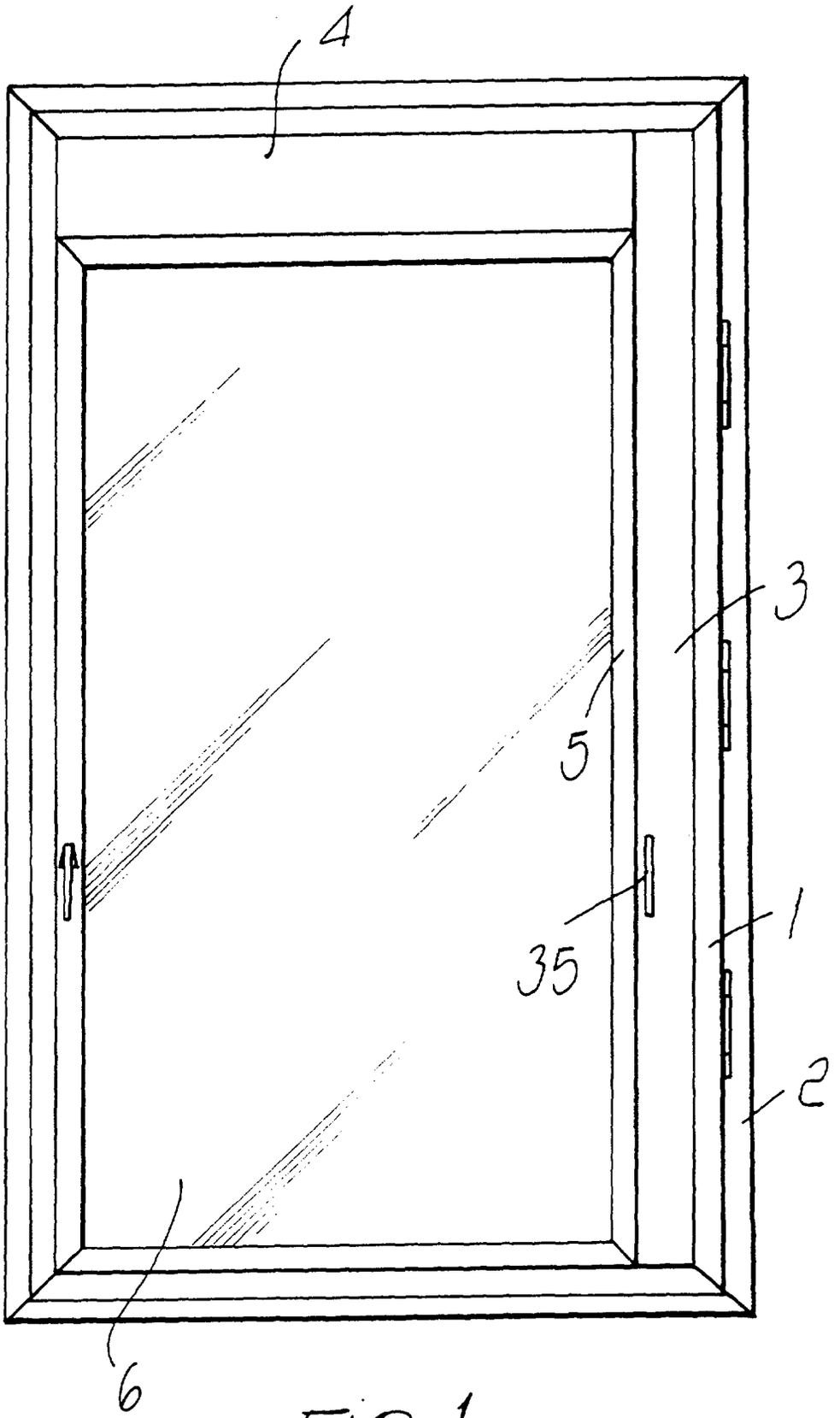

Fig.1

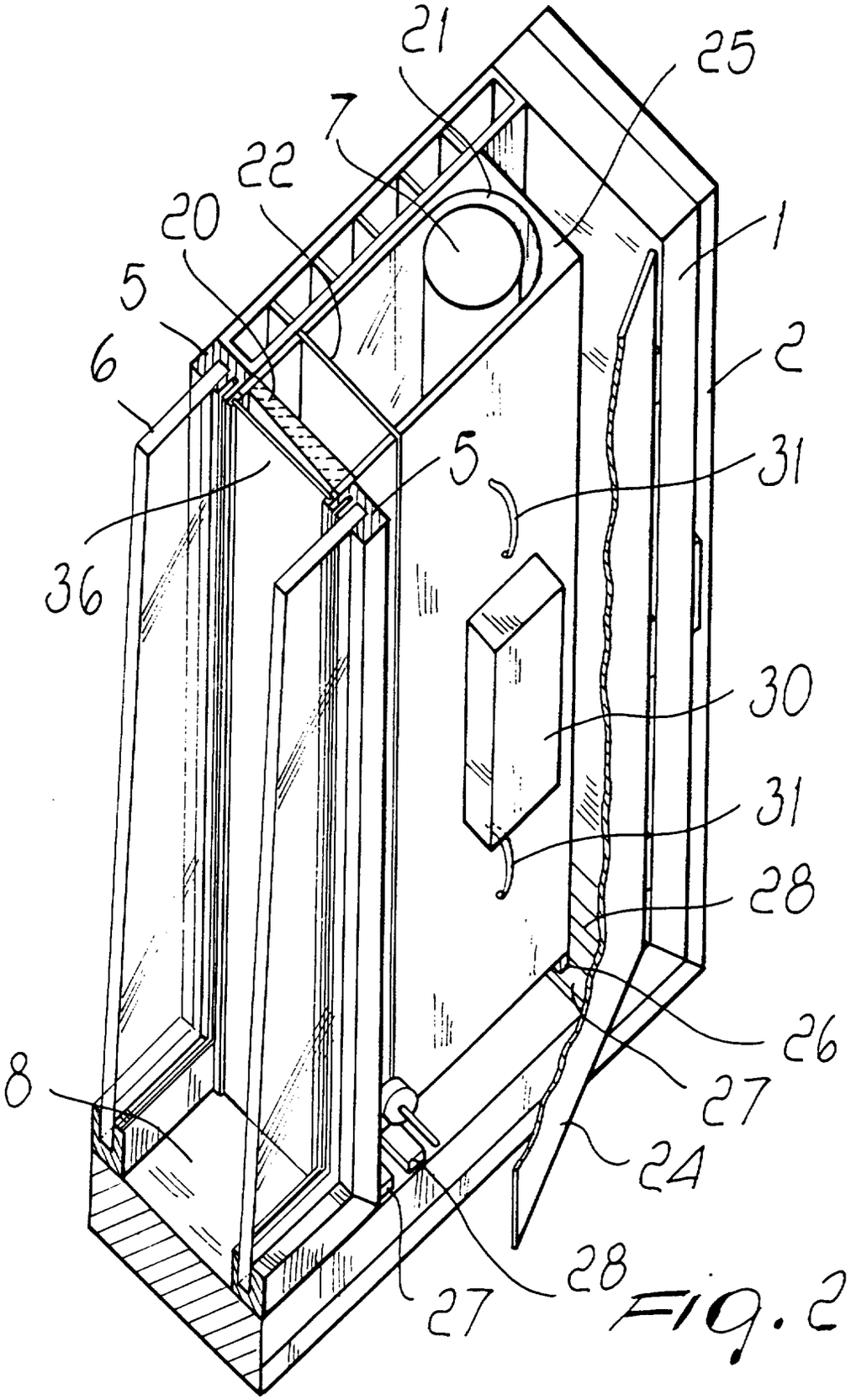

Fig. 2

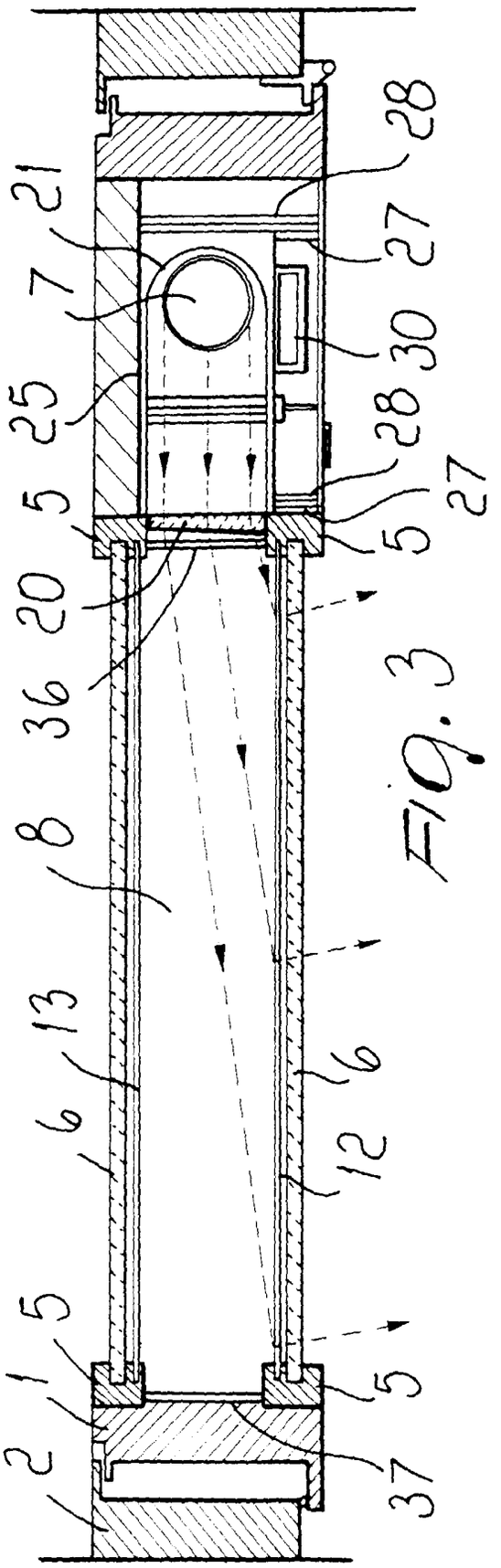

Fig. 3

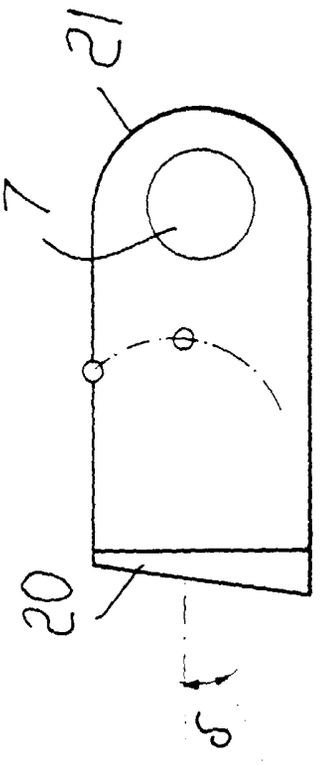

Fig. 6

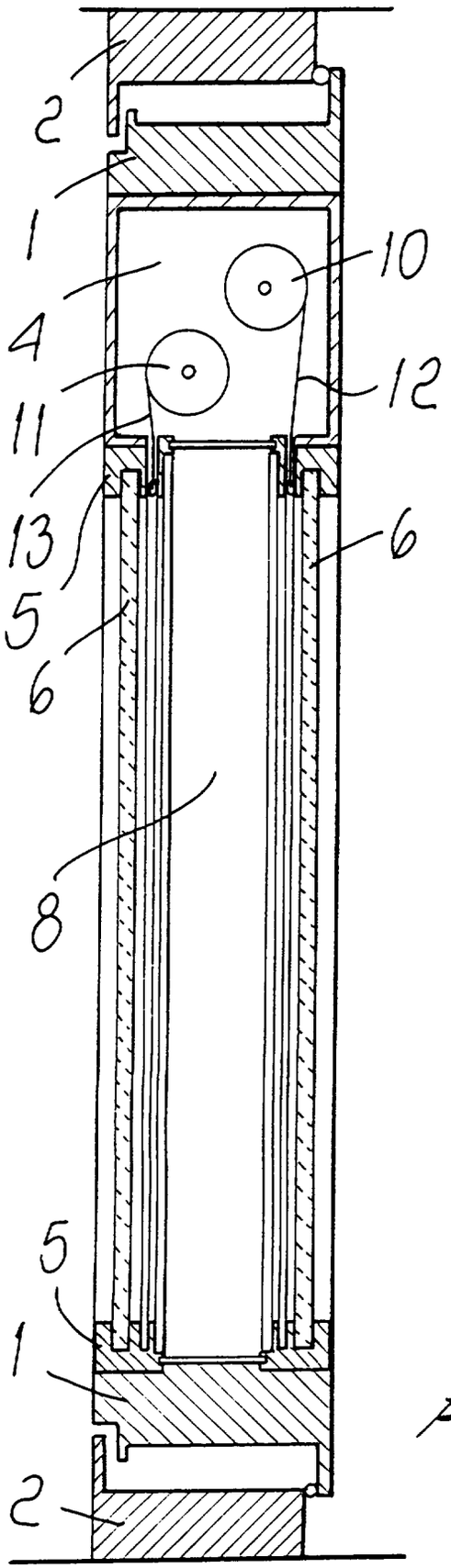

FIG. 4

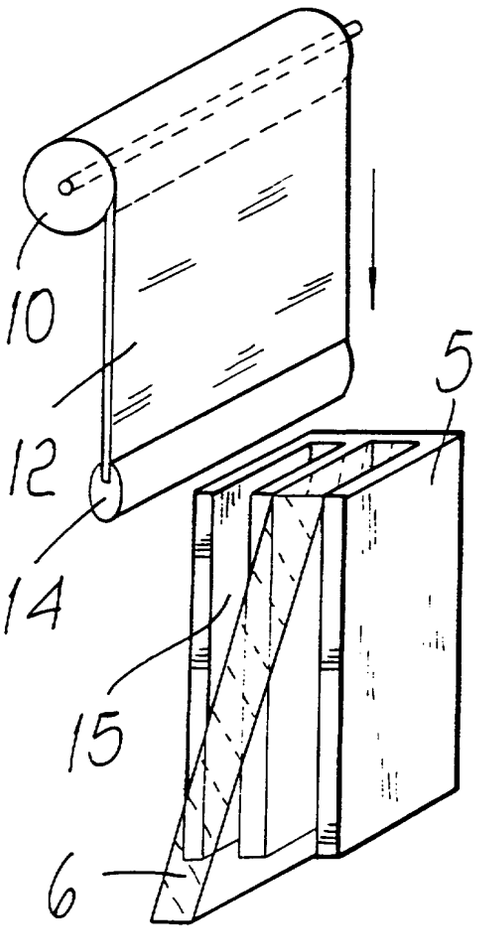

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 00 11 0135

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E06B
G09F
G03B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 August 2000	Fordham, A

CATEGORY OF CITED DOCUMENTS

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