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

(11) EP 1 816 302 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.08.2007 Bulletin 2007/32

(51) Int Cl.:
E06B 9/00 *(2006.01)*

(21) Application number: **07425025.9**

(22) Date of filing: **19.01.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **01.02.2006 IT vt20060001 U**

(71) Applicant: **G.N. Commerciale S.r.L.**
01100 Viterbo (IT)

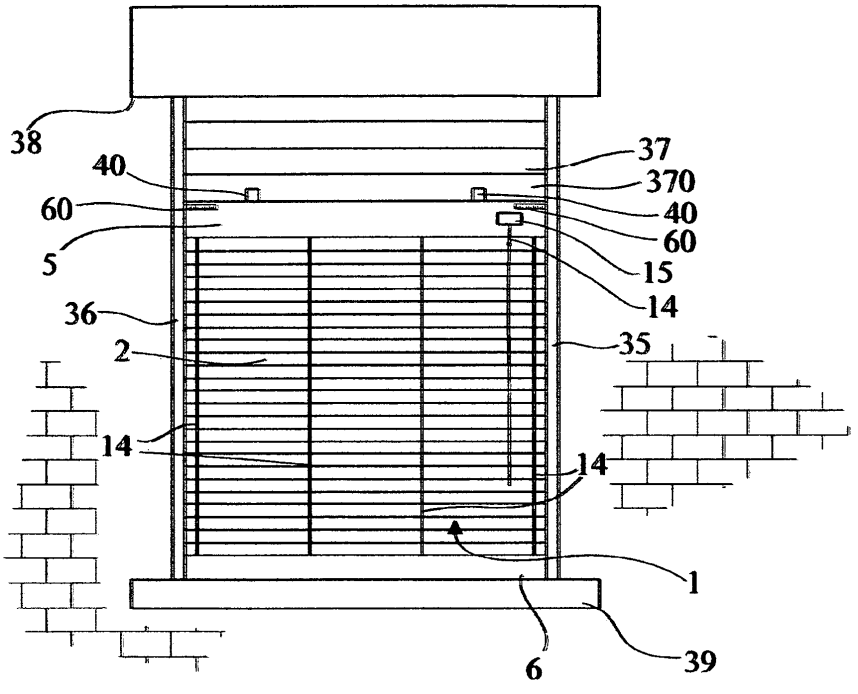
(72) Inventor: **Giannini, Giuseppe**
01100 Viterbo (IT)

(74) Representative: **Cioncoloni, Giuliana**
Studio Consulenza Brevetti
Viale Castrense, 21
00182 Rome (IT)

(54) Pleated sheet mosquito net

(57) Pleated sheet mosquito net (1) comprises a pleated sheet (2) having upper and lower ends (3, 4) and side edges, and vertical guiding rails (35, 36) adapted to receive side edges of the pleated sheet (2). The upper and lower ends (3, 4) of the pleated sheet (2) are connected to upper and lower boxes (5, 6) respectively, the lateral ends of the boxes (5, 6) being received, in the same way of the side edges of the pleated sheet (2), in vertical guiding rails (35, 36). A raising and lowering device able to raise and lower the pleated sheet (2), comprises a plurality of driving cords (14) joined to the lower box (6), passing along vertical and horizontal paths through corresponding holes in the pleated sheet (2), concurrent to a cord lock device (15) situated in the upper box (5) and linked to a manual control line (170).

Fig. 5



EP 1 816 302 A2

Description

[0001] The present invention relates to a pleated sheet mosquito net, adapted to be positioned in one part of a door or window assembly, or between parts thereof. Here and below, the expression "parts of a door or window assembly" means both a window or a French window, that is the part facing the interior of a building, and a shutter, that is the part which is situated generally outside an architectural opening, such as plantation shutters or roller shutters.

[0002] It is difficult to position a mosquito net of "external type" due to a "small space allowable" for its installation. For this reason the well known roller mosquito nets, which are contained in a large box, cannot be used at all. Alternatively, there are mosquito nets with a fixed or a sliding two-part frame, which, being thinner than the roller mosquito nets, can be put into the "small allowable space", also in the guiding rails of a roller shutter. However, the sliding frame mosquito nets have the drawback that an opening for the air passage depends on the frame dimensions and on the sliding part dimension thereof.

Apart from the need of occupying small space transversally and permitting the passage of light and air in the space of the architectural opening, it is relevant to prevent a mosquito net screen to lean, or to bend away from the vertical, by wind or other air currents.

Other features are requested to a mosquito net, so that it can be quickly mounted and dismantled when desired, easily installed, bought by an user as a kit, applied onto various sized architectural openings, and so on.

[0003] The European Patent Application No. EP 1 630 346 A2, published on 01.03.2006, discloses a flexible screening apparatus having upper and lower end bar means so that the upper end bar means can be connected to a lower end of a roller shutter for a window. The upper and lower end bar means are telescopic in order to be fitted into and withdrawn from guiding rails of the roller shutter. The flexible screen, acting generally as a mosquito net, is in the form of a sheet that, when the roller shutter is partially or completely closed, accumulates in disorder, leaning toward both inside and outside with respect to a vertical plane passing through the guiding rails of the roller shutter. This untidy accumulation is a relevant drawback of the apparatus according to the above cited European Patent Application. Further, in the same apparatus it is necessary, when the user wants to receive light and air directly from outside with the roller shutter being wound up, that the lower end bar means is manually lifted and hung to supporting means which are provided in the upper end bar means. As a result of this operation, substantially at least half space of the architectural opening between the roller shutter and a windowsill is yet covered by a double layer of flexible screen. Further, the flexible screening apparatus as such can not be adjusted to architectural openings of different sizes.

[0004] The US Patent Application No. 2006/0108074 A1, published on 25.05.2006, discloses a double-hung window, having lower and upper sashes being moveable with respect to each other in a slidable manner in sash guide tracks, and a pleated screen. The pleated screen has a first end that is mounted to an end of a sash and a second end that is mounted to a frame member so that the pleated screen is extended when the sash is in the open position and it folds onto itself when the sash is in the closed position. The pleated screen has its lateral ends sliding in the sash guide tracks, and further is provided with successive holes in its pleats. Rods are located between guide tracks and traverse the successive holes so that the pleated screen can be maintained tidy both when it extends in the open position of the window sash and it folds onto itself in the closed position of the same. In certain conditions the pleated screen is removable from the window. The above US Patent Application teaches how to use a pleated screen also as a mosquito net, having lateral ends which are housed in sash tracks, but, as in the above cited Patent Application, the screen can be lifted for the light and air passage only after its complete removal.

[0005] The present invention aims to overcome the drawbacks of the prior art mosquito nets.

A main object of the present invention is to permit a screening means to be raised and lowered comfortably to leave a desired space of an architectural opening such as a window or a French window, opened for the light and air passage.

[0006] Another important object of the present invention is to prevent a screening means to lean because of the wind or other air currents.

[0007] Yet, another important object of the present invention is to assure that a mosquito net can be installed without particular technical skill and also by a generic user.

[0008] A further object of the present invention, deriving from the preceding object, is to allow a mosquito net to be sold as a kit comprising few components directly to an user, who can adjust it according to his/her needs.

[0009] Furthermore an object of the invention, which is connected to the preceding object, is to allow a mosquito net to be adapted to architectural openings having different sizes, and then to be universal.

[0010] A further object of the present invention is to manufacture a mosquito net that can occupy a very small transversal space.

[0011] Yet a further object of the present invention is to permit a quick mounting and dismantling of a mosquito net when desired.

[0012] Yet another object of the present invention is to assure a simple use of the mosquito net, as the one of certain well known pleated curtains.

[0013] These and other objects are achieved by a pleated sheet mosquito net according to claim 1 of the present invention.

[0014] The present invention will be now described referring to a preferred embodiment thereof, even if it should be understood that variations can be made with-

out departing from the spirit of the present invention, connection being made to the enclosed drawing, in which:

Figure 1 is a schematic fragmentary perspective view of a mosquito net according to the invention;

Figures 2, 3, and 4 are a top plant view, a front view and a cross-sectional view respectively, all in enlarged scale, of a cord lock device of the mosquito net according to the present invention;

Figure 5 is a schematic front view of the mosquito net according to the invention in a first embodiment thereof;

Figure 6 is an enlarged perspective view of an attaching means for the first embodiment of the mosquito net in Figure 5;

Figure 7 is a schematic front view of the mosquito net according to the invention in a second embodiment thereof; and

Figure 8 is a schematic longitudinal section of an end portion of an upper box of the mosquito net according to the present invention.

[0015] Referring to the drawings, there is shown a perspective view of a mosquito net according to the invention, generally denoted as 1 in Figure 1. Therein a pleated sheet acting as a protective screen is indicated as 2, having an upper end 3 and a lower end 4.

[0016] These upper and lower ends 3 and 4 of the pleated sheet 2 are connected to upper and lower boxes 5 and 6, respectively, which can be obtained from a same section preferably of light alloy, generally indicated as 7. The section 7, which will be described in details with reference to the upper box 5, comprises a core 8 and parallel flanges 9 and 10, so that a U-shaped portion 11 is formed. Oppositely, the core 8 forms a C-portion 130 by means of opposite L-shaped projections 12, 13. Tabs 131 and 132 face each other inward from the parallel flanges 9 and 10 of the U-shaped portion 11.

[0017] The U-shaped portion 11 is adapted to receive the pleated sheet 2 inside itself and in the other side the C-shaped 130 acts as a supporting means for the upper box 5 or as a housing means for latches to hang the upper box 5, as shown below. In order to connect the upper end 3 of the pleated sheet 2 to the upper box 5, a π-shaped section 133 can be used upon its insertion (upside down in the box 5) among tabs 131, 132 and core 8. Preferably, the π-shaped section 133 is made of plastic material. The upper end 3 of the pleated sheet 2, after passing through tabs 131, 132, can be attached to the flat part of the π-shaped section 133 by a double-sided tape 134 or other suitable means.

[0018] The lower box 6 can be obtained from the same section 7, but opposite to upper box 5. The lower end 4 of the pleated sheet 2, after passing through tabs 131, 132, can be attached to the flat part of the π-shaped section 133, positioned upright under the tabs 131, 132 of the section 7 of the lower box 6 by a double-sided tape 134 so as described for the upper end 3 of the pleated sheet 2.

[0019] Both the lateral ends of the boxes 5, 6 and the side edges of the pleated sheet 2 are designed to be received into vertical guiding rails, shown below, which allow the pleated sheet to slide tidily along a vertical plane of an architectural opening.

[0020] A raising and lowering device to raise and lower the pleated sheet 2 is added to the above described arrangement of upper and lower boxes 5 and 6 with interposed pleated sheet 2 according to the known art of the pleated curtains. However, some features according this invention are used in the raising and lowering device which will be evident in the following.

[0021] Turning to Figure 1, the raising and lowering device of the pleated sheet 2 comprises a plurality of driving cords generally indicated as 14, that preferably are connected to the π-shaped section 133 of the lower box 6 of the mosquito net, or to the pleated sheet 2 near it. Along vertical paths from the lower box 6 the driving cords 14 pass through holes correspondingly provided in the pleated sheet 2 in pre-set spacing depending on the width of the pleated sheet 2. The driving cords 14 pass through correspondent holes (not shown) provided in the flat part of the π-shaped section 133 of the upper box 5, and along horizontal paths (not shown) meet in a cord lock device 15, which is preferably located on a level with the π-shaped section 133. Then the driving cords 14 exit the cord lock device 15 and come together to a stop member 160 connected to a manual control line 170.

[0022] The cord lock device 15 of the mosquito net according to the present invention is shown in an enlarged scale in Figures 2 to 4, which are a top plan view, a front view and a cross-section view thereof, respectively. The cord lock device 15 comprises a flattened shallow housing 16, having a depth less than the thickness of the upper box 5, and lateral walls 17, 18, which are preferably tapered to enlarge the housing toward outside, and upper and lower walls 27, 28 parallel with each other. The housing 16 has a preferably rectangular front frame 19, designed to abut the external surface of the upper box 5 when the cord lock device 15 is put horizontally in a matching cut-out 20 provided in the U-shaped portion 11 of the upper box 5. Tongues 21, 22 project from the bottom of the housing 16 and extend parallel with the side walls 17, 18 of the same housing 16 generally slightly wider than the cut-out 20. Thus, when the cord lock device 15 is inserted into the cut-out 20, the tongues 21, 22 elastically are bent toward the side walls 17, 18 of the housing 16 to allow the cord lock device 15 to be inserted until the front frame 19 abuts the external front surface of the upper box 5, and the tongues 21, 22 are bent elastically again far from the side walls 17, 18 of the housing 16. Free ends 23, 24 of the tongues 21, 22 can abut the

internal surface of the U-shaped portion 11 of the upper box 5 to snap in position the cord lock device 15.

[0023] In particular, referring to Figure 4, there is shown that the housing 16 has a rear opening 25 and a front opening 26. Inside the housing 16, a knurled roller 29 is pivotally mounted about a fixed vertical axis 30 between the upper and lower walls 27, 28 of the housing 16. Inside the housing 16 again, there is a second knurled roller 31, freely rotatable around a moveable vertical axis between the upper and lower walls 27, 28 of the housing 16. An internal space 32 of the housing 16 is so configured that, with the vertical axis 30 being fixed, the second knurled roller 31 is able to rotate and substantially displace only in a front-rear direction, on the right hand of the first knurled roller 29, inside the space 32 of the housing 16. The knurled roller 31 is prevented to exit forward by a stop such as a horizontally arranged pin 33 acting also as a sliding surface for the driving cords 14. A vertical pin 34 is arranged rear as an idler element for the same driving cords 14, which, coming from the lower box 6 through the holes in the pleated sheet 2 and the holes in the π-shaped section 133 of the upper box 5, enter the lock cord device 15, passing between the knurled rollers 29 and 31. If the driving cords 14 are pulled and left free so that the movable knurled roller 31 is not engaged with the fixed knurled roller 29, the lower box 6 can be freely raised and lowered. When the driving cords 14 are pulled toward the right hand in Figure 4, they move the movable knurled roller 31 engaged with the fixed knurled roller 29, so that they are conventionally retained between the two knurled rollers 29 and 31. Thereby, the lower box 6 can stop at the desired level and the pleated sheet 2 is extended to the desired opening, as it will be clear from the following detailed description about the installation of the mosquito net according to the present invention.

[0024] As above said, both the lateral ends of the boxes 5, 6 and the side edges of the pleated sheet 2 are received into vertical guiding rails, which allow the pleated sheet to slide tidily along a vertical plane of an architectural opening. Such vertical guiding rails are channels which in a first embodiment can be positioned in a part of a door or window assembly, or in a second embodiment, between the parts of a door or window assembly.

[0025] In the first embodiment, the channels can be sash tracks of a double-hung window assembly as in the above mentioned US Patent Application No. 2006/0108074 A1. Alternatively, the mosquito net can be mounted in the channels forming guiding rails for a roller shutter, as a shutter of the door or window assembly, as shown in Figure 5, that is a schematic front view of a window with such an embodiment. Referring to the Figure 5, the mosquito net according to the invention as shown in Figure 1, is indicated as 1, and guiding rails of a roller shutter 37 are indicated as 35, 36. A roller shutter box is indicated as 38 and a windowsill is countersigned as 39.

[0026] The upper box 5 of the mosquito net 1 is fixed to a free end terminal last 370 of the roller shutter 37, for example by using fixing points for the roller shutter stops. The connection between the upper box 5 and the free end terminal last 370 of the roller shutter 37 is achieved by means of at least a pair of connection members generally indicated as 40, such as that one shown in Figure 6, that is a perspective view thereof.

[0027] Referring to Figure 6, each connection member 40 comprises a U-shaped portion 41, whose legs are provided with opposite slots 42 for bolts such the above cited fixing bolts for stops. T-shaped projections 43, 43 designed to slidably engage the C-shaped portion 130 of the upper box 5 extend outward from the core of the connection member 40. Alternatively, the mosquito net can be fixed to the terminal last of the roller shutter by universal connections and quickly removable hooks.

[0028] In the above described embodiment, in which the connection of the mosquito net 1 according to the invention to the roller shutter 37 is provided, the mosquito net 1 can be adjusted by the cord lock device 15 on a desired level so that an enclosed space of the architectural opening is covered fully or partially. The pleated sheet is raised and lowered by pulling and releasing, respectively, the driving cords 14 exiting the upper box 5 of the mosquito net 1 through the cord lock device 15 especially designed to be housed in the small width channel of the guiding rails of the roller shutter 37. By raising the roller shutter 37, it drag with itself the mosquito net 1 which is connected through its upper box 5 to the terminal last 370 of the roller shutter 37 by means of the connection members 40 or similar. By releasing the driving cords 14 from the cord lock device 15, the lower box 6 of the mosquito net 1 descends by sliding together with the pleated sheet 2 along the opposite parallel guiding rails 35, 36 of the roller shutter, without the aid of any fitting. Thereby, the pleated sheet is stretched, while it remains with its side edges being inside the guiding rails 35,36.

[0029] The above cited second embodiment, according to which the mosquito net 1 according to the invention is positioned between the parts of a door or window assembly, is represented in the front view of Figure 7, in which substantially the same reference numerals are used to identify similar parts. In this second embodiment, the mosquito net 1 is applied to a frame 44 of an architectural opening, in which vertical side guiding rails 35, 36 in the form of channels are located between the parts of a window assembly, i. e. between a window or French window and a shutter, such as a plantation shutter, both not shown in Figure 7.

The vertical side guiding rails can be mounted where there is a space, even if small (20 mm), for example between a window and a plantation shutter. The vertical side guiding rails can be fixed to the frame 44 by fixing means, for example by screws or plugs, by quick connection member such as clips or double-sided tape, or they can be embedded in the frame of the window assembly.

[0030] In this second embodiment, the vertical side guiding rails 35, 36 and the upper box 5 have co-operating means for mounting the mosquito net 1 on the same

level of the one side guiding rail and the other. These cooperating means for mounting the mosquito net 1 comprise a latch generally denoted as 45 in each end of the upper box 5 and bores in both side guiding rails 35, 36. An example of latch 45 is shown in Figure 8, which is a schematic enlarged longitudinal cross-section view of an upper end portion of an upper box 5 of the mosquito net 1 according to this invention.

Referring to Figure 8, the latch 45 comprises a slider 46 slidably mounted in the C-shaped portion 130 of the upper box 5 of the mosquito net 1. The latch slider 46 forms a step 47, i.e. the slider 46 is divided in a front part 48 and a rear part 49.

The front part 48 of the slider 46, having a free end 50, is obliged to slide inside the C-shaped portion 130, and the rear part 49 slides outside the same portion 130.

[0031] A guide member 51 is arranged in the front of the section 7 of the upper box 5, which is closely fitted by its prismatic portion 52 like a plug among the core 8 and the tabs 131, 132 of the section 7. The guide member 51 has a slot 53 adapted to retain the front part 48 of the slider 46. A front part 54 of the guide member 51 acts also as a spacer for the upper box 5 and the sheet supported thereby, in order to prevent the guide member 51 to rub the vertical side guiding rail 36 (and the vertical side guiding rail 35, on the opposite end of the upper box 5), which are formed by the channels.

[0032] The rear part 49 of the slider 46 is provided with an elongated slot 55 adapted to receive a dowel 56 which is screwed to the bottom to the C-shaped portion 130 of the section 7, i.e. to the core 8. The dowel 56 is suitable to maintain at the back the latch 45 adherent to the guide represented by the C-shaped portion 130 of the section 7. A coil spring 57 is abutted between the step 47 of the slider 46 and the dowel 56. With this arrangement the slider 46 has normally the free end 50 projecting from the guide member 51, since the slider 46 is charged outward by the coil spring 57.

[0033] When the upper box 5 has been put in the vertical side guiding rails 35, 36, the free end 50 of the slider 46 is thrust to be in contact with a bottom wall 58 of the vertical side guiding rails 35, 36, and to rub against the bottom wall 58 until it is brought to match the seat of the latch 45, advantageously on the maximum level of the frame 44 of the architectural opening, where a through bore 59 is made in the bottom wall 58 of the vertical side guiding rail 36. The free end 50 of the slider 46 snaps into the through bore 59, and the same occurs for the latch 45 positioned in the opposite end of the upper box 5 with respect to the vertical side guiding rail 35. Therefore, the installation of the mosquito net 1 provided with latches 45 in the upper box 5 is achieved comfortably with a snap in the pre-set position.

[0034] Advantageously, as shown in Figure 5, linear centimetre scales, generally denoted as 60, are fixed on upper and lower boxes 5, 6, near their ends in a position that is external with respect to the sliding paths of the driving cords 14. Thereby, the boxes 5, 6 are easily adjusted in their lateral sizes to be adapted to the architectural openings involved. Therefore, the mosquito net 1 can be reproduced in modular units, which can be reduced to the requested dimension by cutting the upper and lower boxes both in their right and left ends.

Thus, storing problems can be solved because spares for architectural openings of all possible dimensions do not have to be prepared.

[0035] All the above mentioned objects of the present invention are achieved. The screening sheet acting as a mosquito net can be raised and lowered comfortably to leave a desired space of an architectural opening, either a window or a French window, opened to the passage of light and air. By virtue of the driving cords, which are retained by the cord lock device, the screening sheet does not lean nor bend away from the vertical by the wind or other air currents. Special skills are not required to install the mosquito net according to the invention, and therefore its installation can be performed by the same user. The mosquito net can be sold as a kit of few components that the user can buy and adapt according her/his needs. In particular, the mosquito net can be applied to architectural openings having various sizes, and then it can be considered universal. Further, the mosquito net occupies a reduced transversal space, can be quickly mounted and dismantled when required and also its use is comfortable and practical.

Claims

1. A pleated sheet mosquito net (1), comprising a pleated sheet (2) as a protective screen, having upper and lower ends (3, 4) and side edges, and vertical guiding rails (35, 36) adapted to receive said side edges of the pleated sheet (2) to allow the pleated sheet (2) to tidily slide in a vertical plane of an architectural opening, **characterised in that** said upper and lower ends (3, 4) of the pleated sheet (2) are connected to upper and lower boxes (5, 6) respectively, the lateral ends of the upper and lower boxes (5, 6) being received, in the same way of the side edges of the pleated sheet (2), in said vertical guiding rails (35, 36), and **in that** there is provided a raising and lowering device able to raise and lower the pleated sheet (2), comprising a plurality of driving cords (14), which are substantially joined to the lower box (6), passing along vertical and horizontal paths through corresponding holes of the pleated sheet (2), concurrent to a cord lock device (15) situated in the upper box (5) and linked to a manual control line (170).

2. The pleated sheet mosquito net (1) according to claim 1 wherein upper and lower boxes (5, 6) are made of a section (7) comprising a core (8) and flanges (9, 10) forming, in one side, a U-shaped portion (11) adapted to receive inside the pleated sheet (2),

and, in the other side, a C-shaped portion (130).

3. The pleated sheet mosquito net (1) according to claim 1 wherein said vertical guiding rails (35, 36) are channels that are located in one part of door or window assembly in the architectural opening.

4. The pleated sheet mosquito net (1) according to claim 3 wherein said vertical guiding rails (35, 36) are sash tracks of a double-hung window assembly.

5. The pleated sheet mosquito net (1) according to claim 3 wherein said vertical guiding rails (35, 36) are guiding rails of a roller shutter (37).

6. The pleated sheet mosquito net (1) according to claim 4 wherein said upper box (5) is connected to a free end of a window sash in a double-hung window assembly.

7. The pleated sheet mosquito net (1) according to claim 5 wherein said upper box (5) is connected to a free end terminal last (370) of a roller shutter (37).

8. The pleated sheet mosquito net (1) according to claims 2, 5, and 7 wherein the upper box (5) is connected to the free end terminal last (370) of the roller shutter (37) by means of at least a pair of U-shaped connection members (40) having T-shaped projections (43) designed to slidably engage the C-shaped portion (130) of said upper box (5).

9. The pleated sheet mosquito net (1) according to claim 1 wherein said vertical guiding rails (35, 36) are channels that are located in the architectural opening between the parts of a door or window assembly.

10. The pleated sheet mosquito net (1) according to claims 1 and 9 wherein said vertical guiding rails (35, 36) and said upper box (5) have co-operating members for mounting the mosquito net at the same height of both vertical guiding rails (35, 36).

11. The pleated sheet mosquito net (1) according to claim 10 wherein said co-operating members for mounting the mosquito net comprise a latch (45) in both ends of the upper box (5), and respective seats (59) in both vertical guiding rails (35, 36).

12. The pleated sheet mosquito net (1) according to claim 1 wherein the cord lock device (15) comprises a flattened, shallow housing (16) adapted to be located horizontally by its external flexible side tongues (21, 22) lockable in a cut-out (20) of the upper box (5), the flattened, shallow housing (16) having a rear opening (25) and a front opening (26) and containing a first knurled roller (29) pivotable about a vertical fixed axis (30), and a second knurled roller (31) being freely rotatable about a moveable vertical axis and displaceable substantially only in front-rear direction when said plurality of driving cords (14) is passed between the first knurled roller (29) and the second knurled roller (31).

13. The pleated sheet mosquito net (1) according to claim 12 wherein said front and rear openings (25, 26) of the housing (16) of the cord lock device (15) are provided with means adapted to reduce friction in order to assist said plurality of driving cords (14) in sliding.

14. The pleated sheet mosquito net (1) according to claim 12 wherein said plurality of driving cords (14) are attached to a stop member (16).

15. The pleated sheet mosquito net (1) according to claim 1 wherein linear centimetre scales (60) are fixed on upper and lower boxes (5, 6) in a position that is external with respect to the sliding paths of said driving cords (14).

Fig. 1

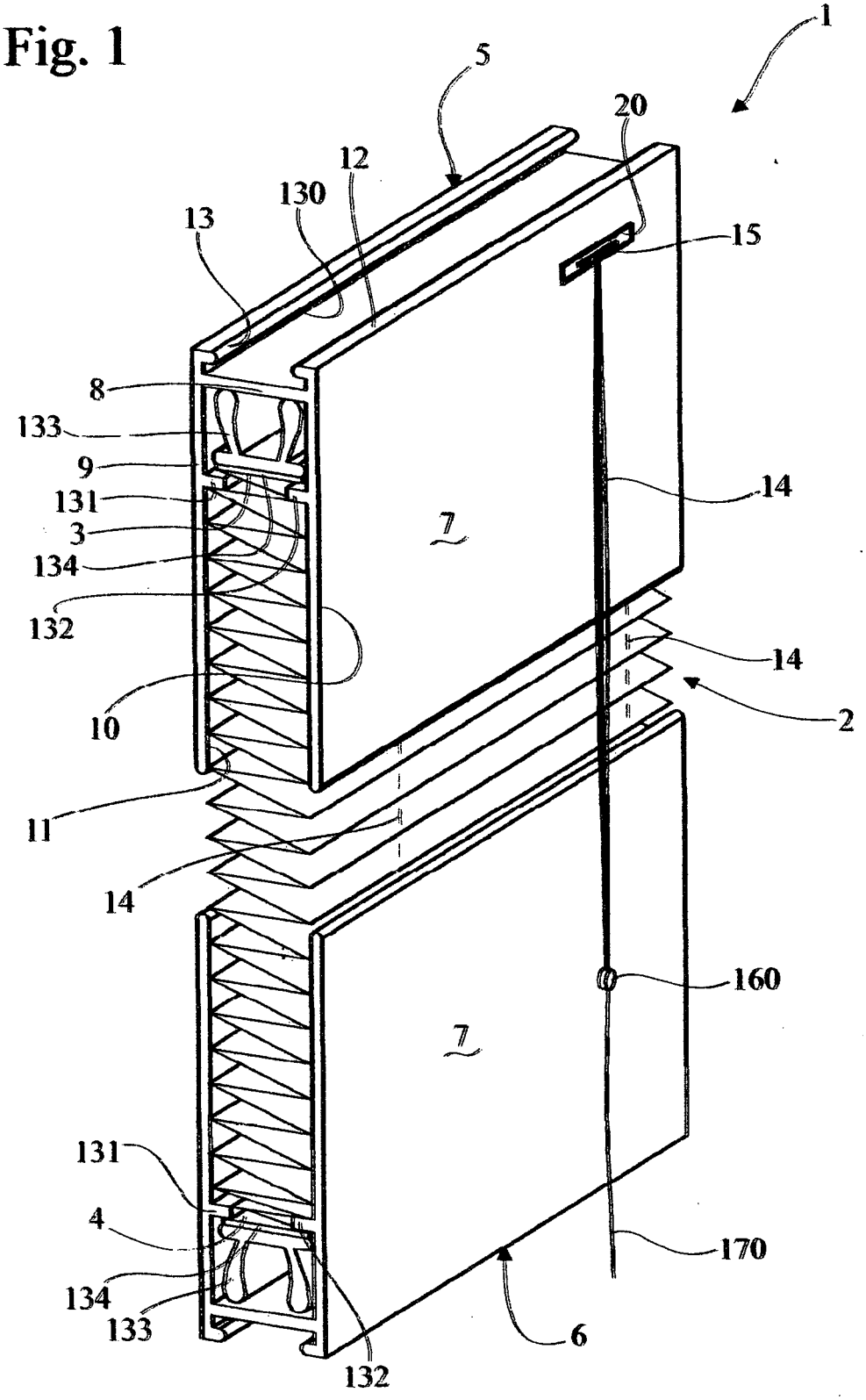

1
5
20
12
130
13
15
8
133
9
131
3
134
132
14
7
14
2
10
11
14
160
7
131
4
134
133
132
170
6

Fig. 2

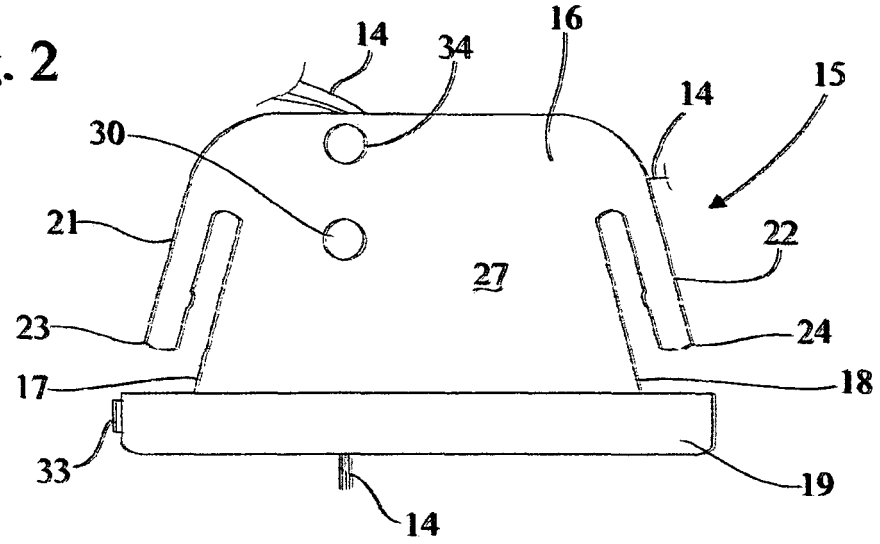


Fig. 3

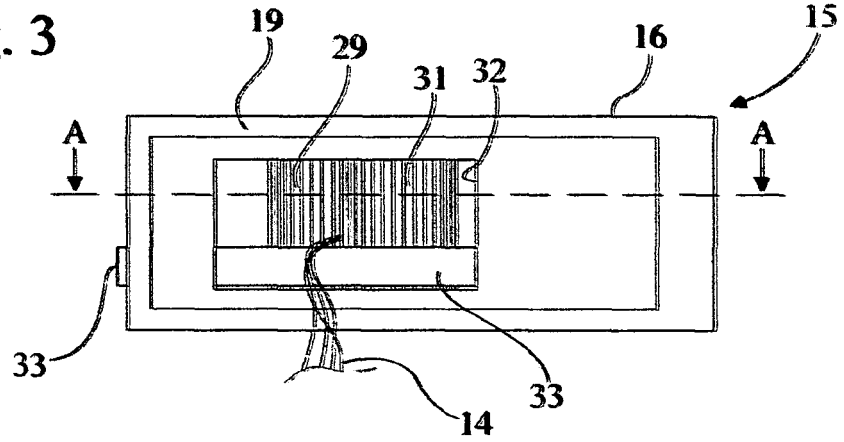


Fig.4

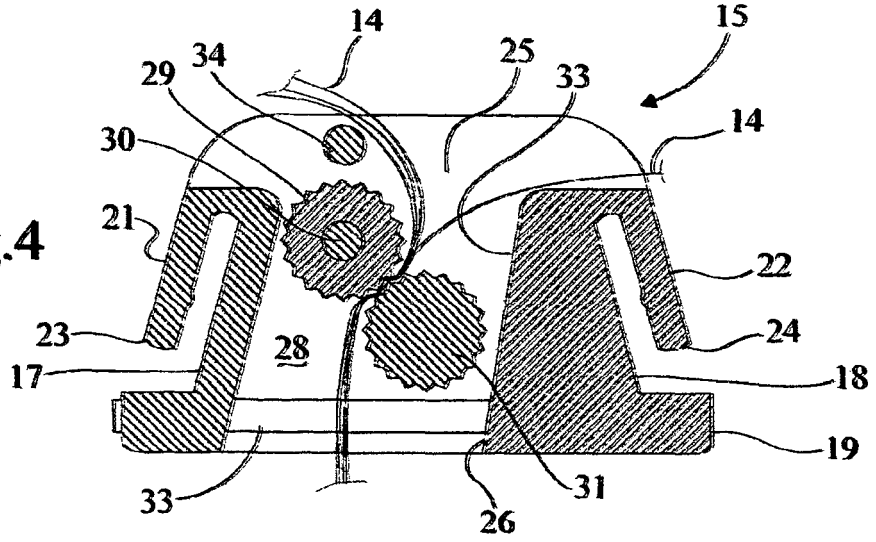


Fig. 5

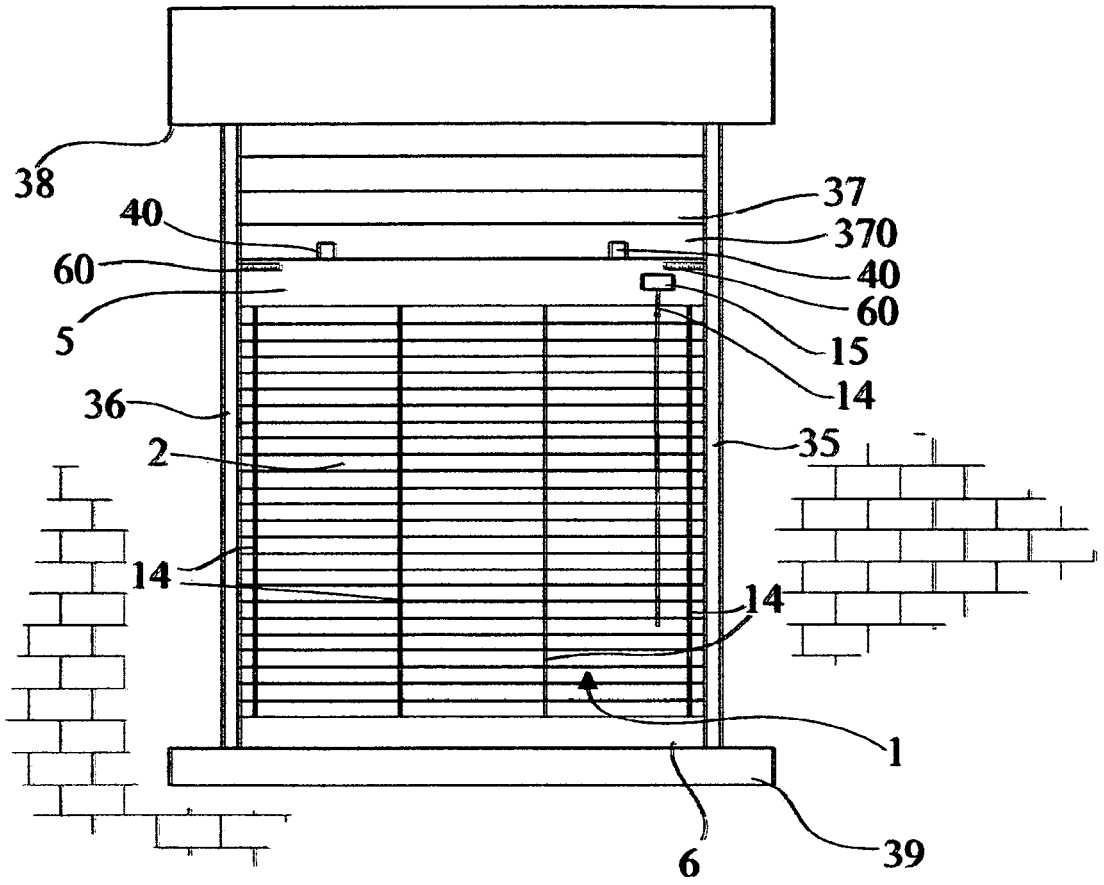


Fig. 6

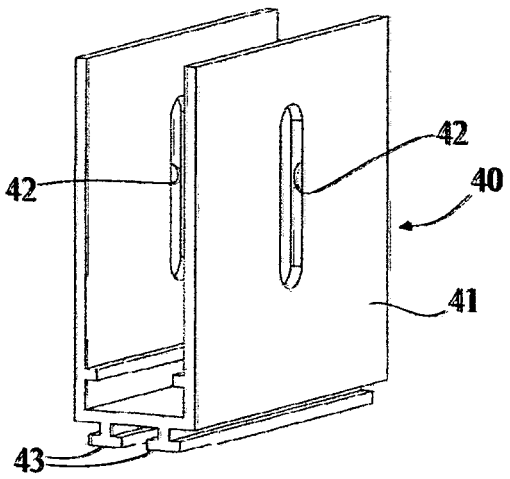


Fig. 7

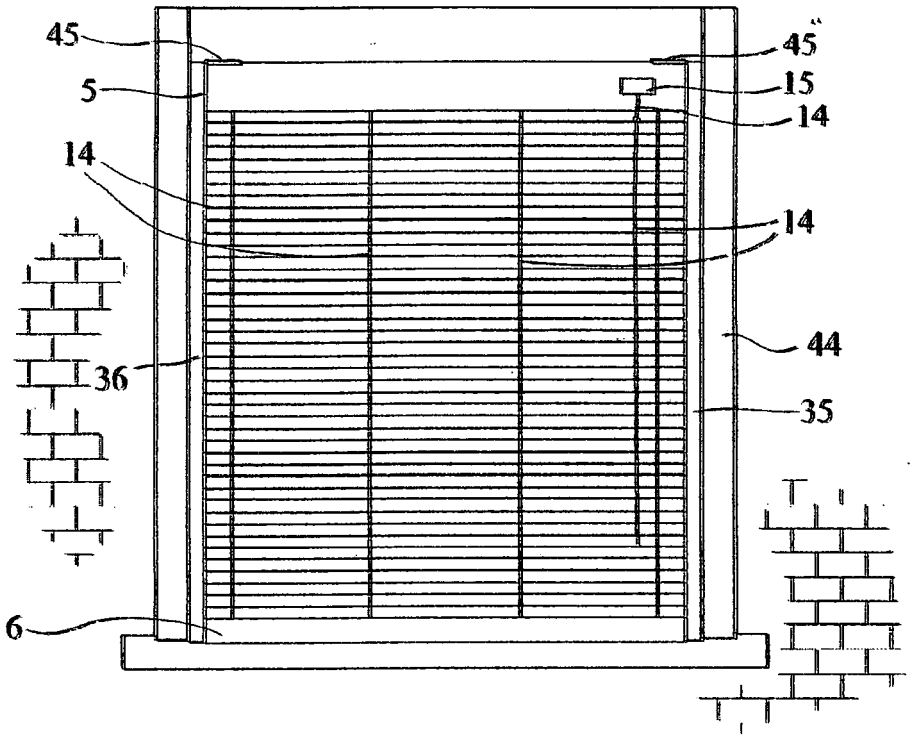
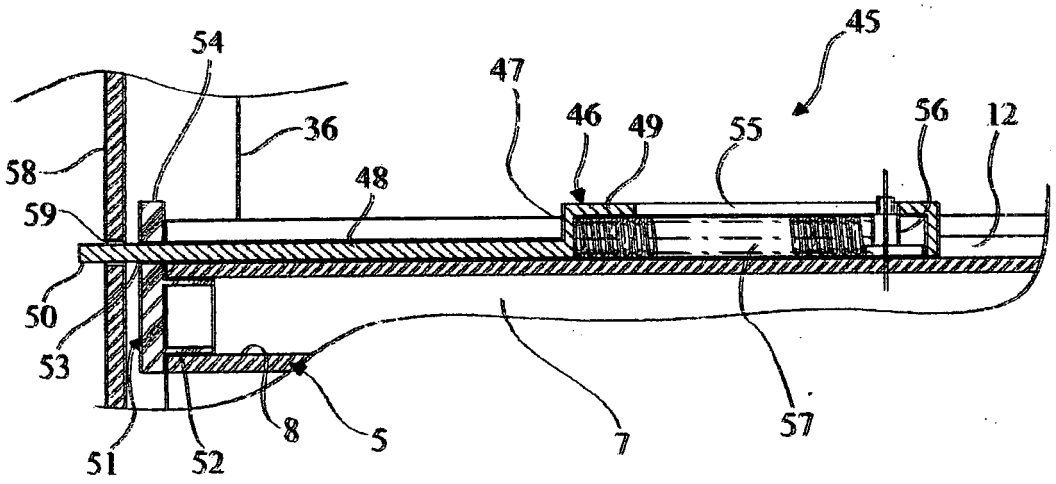

45
45"
5
15
14
14
14
44
36
35
6

Fig. 8


54
45
47
36
46
49
55
56
12
58
48
59
50
53
8
5
7
57
51
52

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1630346 A2 **[0003]**
- US 20060108074 A1 **[0004] [0025]**