



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.08.2009 Bulletin 2009/32

(51) Int Cl.:
E06B 9/52 (2006.01)

(21) Application number: **09001216.2**

(22) Date of filing: **29.01.2009**

(84) Designated Contracting States:
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 SE SI SK TR
Designated Extension States:
AL BA RS

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(30) Priority: **01.02.2008 IT TV20080021**

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(54) **Mosquito-net with net-guiding chain driving device for net with horizontal sliding**

(57) Mosquito-net with net-guiding chain driving device for net with horizontal sliding, including:

- a) a vertical roller shutter box (10) with roller, lateral as compared to a horizontal upper and fixed guide; the net (1a) is joined with a first end to the roller;
- b) a horizontal and fixed upper guide (20);
- c) a vertical handlebar (30) to which the second end of the net is joined, with the upper end (31) fixed to the fixed guide and mobile longitudinally;

- d) a net guiding chain (40) with containing seat of the lower profile of the net; the net guiding chain consisting of reciprocally interconnected modular elements, where said net guiding chain, is engaged with a first end at the lower end of the roller shutter box, while the second end slides inside the handlebar;
- e) a driving device of the net guiding chain, comprising at least a rope and relative connecting means placed at least inside the handlebar and fixed upper guide.

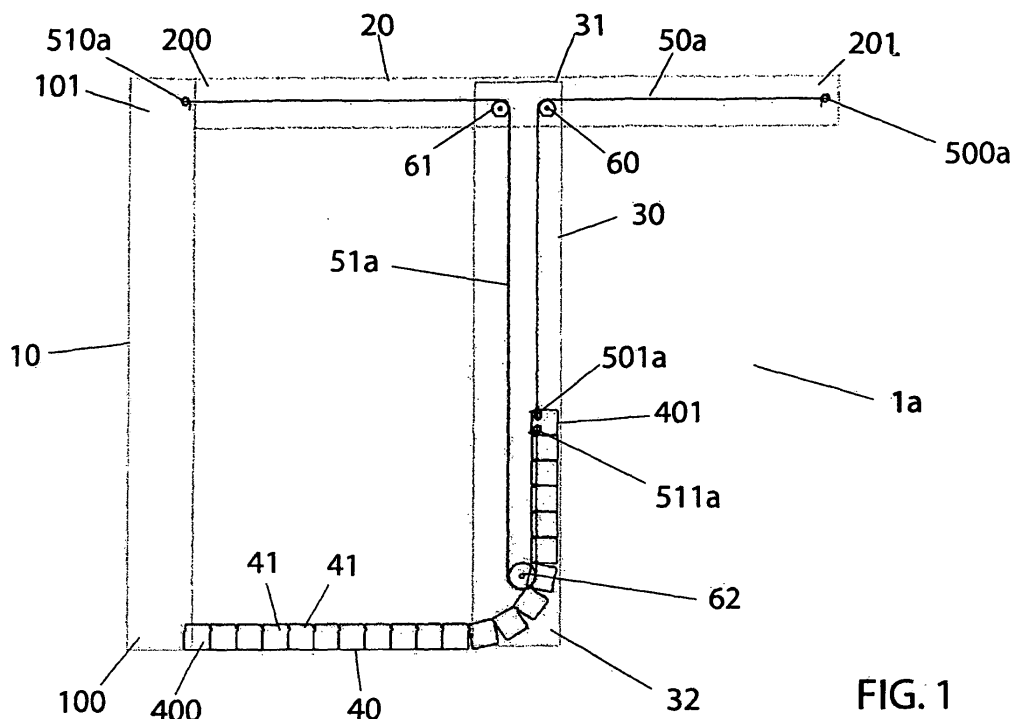


FIG. 1

Description

[0001] The subject of this invention is a mosquito-net with net-guiding chain driving device for net with horizontal sliding.

Domain

[0002] The invention, finds particular even if not exclusive application in the field of components and accessories for frames, as mosquito-nets for preventing insects from entering inside conventionally inhabited places, for example houses and offices.

[0003] The mosquito-nets can be usually put into two categories. A first, so-called made-to-measure, that is a type of mosquito-net realised according to sizes received from the client, to be delivered to the final recipient allowing for the installation by specialist staff; a second, indicated as mosquito-net in assembly kits, is that much more common on the market.

[0004] In both said categories of mosquito-nets, there are common realization elements; which can be explicitly by the roller shutter box, of the type generally given by a profile or extruded aluminium bar, on the inside of which is coaxially inserted the mosquito-net roller. In the non-motorized version, the roller may also include one corresponding preloaded return spring. Concerning The ends of the roller shutter box, they are normally closed by suitable plates, or better heads, which are supplied in two versions, fixed or with counter-plates or caps which are adjustable.

[0005] Of course, variations are also known, they, however, appear very similar to the here described solutions and are recurrent, as much in mosquito-nets, as in curtains and, finally, in the shade curtains. One of these, for example, regards less valuable mosquito-nets, without the preloaded spring inside. These are differentiated from the first ones, because they require manual operations, both for unwinding the curtain from the roll and for re-winding it. In one case, for example, a closed circuit chain is used, which engaging, from one side, a wheel or pulley keyed to the relative roller, housed in a roller shutter box, determines the winding, or unwinding of the mosquito-net in a controlled way.

[0006] These mosquito-net solutions, which slide the net horizontally or vertically, are therefore composed as such:

- a) a roller shutter box, closed at the ends by corresponding heads;
- b) a roller, inside said roller shutter box, supported at the ends by a couple of heads, which are engaged at the end of the roller shutter box;
- c) a possible helicoidal torsion spring placed coaxially, cooperating with said roller;
- d) a net, anchored on one side to said roller and at the other joined to a handlebar;
- e) and finally, two parallel slide-ways, inside of which

are slideable ends of said handlebar and the side flaps of the net.

Prior art

[0007] In EP753642 (Metaco) a shielding device is described, comprising a foldable shield having a base side, a left-hand side and a right side, the shield extending longitudinally between a left-hand frame element extending upwards and a right-hand frame element extending upwards, longitudinally movable the one with respect to the other in order to open the foldable shield, the apparatus including moreover a top guide element extending longitudinally and an base guide element extending longitudinally, each guide element being flexible and bent in a cross direction adjacently to one of the left-hand and right-hand frame elements so as to present a free end that moves downwards and upwards as regards one of said left-hand and right-hand frame elements when the shield is opened or closed, each guide element having flexing elasticity determining an elastic return force, characterised in that the free ends of each guide element slides along one of said left-hand or right-hand frame elements, in that the other end of each guide element is fixed to the other one of the left-hand and right-hand frame elements, and in that the left-hand frame element, the right-hand frame element, the top guide element and the base guide element form a frame.

[0008] EP 999335 (Metaco) describes a shielding device including:

A couple of assembly frames of the shield respectively opposite, at least one of which is sliding;

A shield mounted between said assembly frames of the shield in order to allow for its opening and closing;

A sliding guide frame situated close to a side of said shield not connected to the shield assembly frame, at least one end of which is an insertable free end and is extractable from inside of one of said shield assembly frames.

Said guide frame is formed by a number of interconnected rigid units, each of which presents a couple of side-walls respectively opposite and a connecting portion that interconnects said side-walls, adjacent rigid units being turnable between each other so that the sliding guide frame is foldable; stopping means associated to said rigid units, said stopping means preserving the straightness of an extracted portion of the sliding guide frame when the sliding guide frame is extracted from the assembly frame of the shield at the sliding of the assembly frame of the sliding shield.

[0009] Guides made up with rigid units consecutively interconnected are known. In JP 53-51648 the guide is pointed out, formed by rigid units consecutively hinged, a section of which extends in parallel to the edges of the screen. An end of the structure formed by the concatenated portions is received and extracted from the inside

of the screen assembly frame, represented by the box or roller shutter box. In JP 06-158961, one can gather that it proposes the use of folding guide structures made up of consecutively interconnected rigid units, extending along the opposite edges of a curtain and presenting end segments to be extracted and inserted in one of the stanchions of the framework. It clearly relates to a shielding device having a curtain extending between a fixed stanchion and a movable stanchion. Along each of the opposite horizontal edges of the curtain, there is a flexible guide structure made up of a number of rigid units pivotably connected one after another by means of pins. The guide structure, engaged in a slidable way along a fixed section, presents an end fixed on the movable stanchion and an end section sliding and guided along a shaped prolongation of the section. The guide structure therefore maintains a rectilinear development in the section extracted from the fixed stanchion, and flexes at the input opening in the stanchion to be housed and extracted from the same in accordance with the opening and closing movements of the curtain.

[0010] In conclusion, it is also reasonable to consider known:

- a) a shielding body that includes a base, two sides and a top;
- b) two longitudinally movable vertical stanchions;
- c) an upper guide element and a lower guide element which are flexible and folded along one of the stanchions with a free end that moves downwards and upwards;
- d) the end opposite to the free one of the upper and lower guide elements is engaged along the stanchion;
- e) the stanchions and the upper and lower guide elements form a frame.

Furthermore:

- a) a couple of stanchions, shield or screen assembly frame, at least one sliding;
- b) a screen;
- c) a sliding guide element, not connected to the couple of stanchions, with an end free to slide in one of said stanchions;
- d) the sliding guide element is formed by adjacent rigid interconnected units, each with a couple of parallel side-walls and a connecting portion that joins the walls, and in which the rigid units turn so that the guide element is foldable;
- e) stopping means that preserve the straightness of the guide element portion when it is extracted from the stanchion.

Drawbacks

[0011] From the functional point of view, the represented screen solutions all aim to contain, if not apparently eliminate, the visual impact of horizontal and parallel

guides that are usually placed along the horizontal levels that delimit, on the upper and lower part the architectonic opening to be closed with said protective screen. However, the represented solutions are not able to minimize in an effective way the sizes of guides where present, with an aesthetic aspect that results in conclusion little acceptable. Furthermore, in as regards the solutions both with guides and without guides, the mechanisms are not particularly efficient in allowing for smooth screen movement, thus not guaranteeing linear sliding and the correct tension of the net. In addition, the illustrated solutions seem constructively complex, not easily manufacturable also due to the presence of a large number of codes that complicate warehouse management.

[0012] From these introductive considerations, identifying alternative solutions is certainly preeminent.

[0013] The aim of this invention is also to avoid the above-mentioned drawbacks.

Summary of the invention

[0014] This and other aims are reached by the present invention according to the characteristics as in the included claims solving the arising problems by means of a mosquito-net with net-guiding chain driving device for net with horizontal sliding, made up by:

- a) a vertical roller shutter box, lateral as regards a horizontal and fixed upper guide, containing the net roller; said net is joined with a first end to the roller;
- b) a horizontal and fixed upper guide, joined with an end at the upper end of the vertical roller shutter box;
- c) a vertical handlebar to which the second end of the net is joined; the handlebar being with the upper end constrained to the fixed guide and mobile longitudinally as to said fixed guide;
- d) a net-guiding chain with seat containing the lower edge of the net; the net-guiding chain consisting of modular elements which are interconnected, where said net-guiding chain is with a first end engaged to the lower end of the roller shutter box, while the second end slides inside the handlebar;
- e) a driving device of the net-guiding chain, comprised at least of a rope and relative transmission means placed at least inside the handlebar and the fixed upper guide.

Aims and advantages

[0015] In this way, by the considerable creative contribution the effect of which constitutes immediate technical progress, multiple advantages are achieved.

[0016] A first and unquestionable value, as regards the conventional mosquito-nets, consists in the fact that the mosquito-net does not have a lower guide, and in any case, for particularly wide openings, can provide also a guide but that however has an extremely contained thickness.

Under the practical profile, when the mosquito-net is not pulled out, that is, the net is wound on the corresponding roller, it is not visible or significantly visible, along the lower plane of the architectonic opening to be closed, any element that can be little aesthetically acceptable and obstacle to the free transit of people and things.

[0017] Compared to the previous solutions, the provision of the roller, inside the roller shutter box, allows for a persistent yet light tension on the net, which, when pulled out offers greater guarantee of effectiveness against intruding insects, and simultaneously the tensesness remains uniform and particularly resisting to the deformations also with insistent pressure on the surface of same, e.g. because of a faster air circulation

[0018] Moreover, because of the particular driving device, the movement of the handlebar is smooth and easy requiring only slight effort from the user.

[0019] One more aim is that the assembly and vice-versa of the mosquito-net is more effective and noticeably comfortable, the roller shutter box is contained dimensionally, favouring housing in the narrow seats and as a whole with less visual impact.

[0020] These and other advantages will appear from the following detailed description of at least one preferred solution with the aid of enclosed schematic drawings whose details are not to be considered limitative but only illustrative.

Content of drawings

[0021]

Figure 1, represents a view of the mosquito-net with horizontally sliding net, with a first driving device solution of the net-guiding chain;

Figure 2, represents the mosquito-net with horizontally sliding net, with a second driving device solution of the net-guiding chain;

Figure 3 is a mosquito-net with horizontally sliding net, with a third driving device solution of the net-guiding chain;

Finally, figure 4 is still a mosquito-net with horizontally sliding net, with a fourth driving device solution of the net-guiding chain.

Practical realization of the invention

[0022] With reference to figures 1, 2, 3 and 4, the mosquito-net 1 a, 1b, 1c, and 1 d, includes a lateral and vertical roller shutter box 10, on the inside of which there is a roller and a relative net or screen, with a first end joined to the said roller and around which it is wound to be turned exiting sideways from said roller shutter box 10. The roller, in one case, has a helical charging spring, that is fixed with one end to said roller, in such a way that, turning the net, the roller also turns involving the charging by twisting of the helical spring, not illustrated, and the consequent

tension of the net. At the upper end 101, a fixed horizontal upper guide 20 with two ends 200, 201, respectively right and left, is joined to the vertical roller shutter box 10, along which a vertical handlebar 30 is longitudinally movable, in and out, that is perpendicular to said fixed guide 20.

[0023] At the lower end 100 of the roller shutter box 10, a first end 400 of the net guiding chain 40 is fixed which consists of a series of rigid modules 41, reciprocally hinged, where the length of the net guiding chain 40 is at least equal to the width of the opening to be closed by means of the installation of the mosquito-net 1a, 1b, 1c, and 1d. The second end 401 of the net-guiding chain 40 slides in a controlled way inside the handlebar 30 that is substantially hollow. More particularly, the second end of the net is engaged to the handlebar 30. The first end, as said, is engaged to the roller of the roller shutter box 10, in such a way that moving the handlebar 30 the contextual winding-unwinding for distending the net and the sliding inside the handlebar 30 of the net-guiding chain 40 takes place. During the unwinding and rewinding of the net, the lower border, longitudinally remains inside the profile of the modules 41 of the net-guiding chain 40.

[0024] In the mosquito-net 1 a shown in figure 1, the driving movement of the net-guiding chain 40 is controlled by a device essentially made up by two ropes, the first 50a has its end 500a engaged at the end 201 of the fixed guide 20 and by means of a pulley 60 hinged at the upper end 31 of the handlebar 30 transmitted along the handlebar 30 to be fixed with the head 501 a to the head module 41 of the net-guiding chain 40. The rope 51 a is engaged with the end 510a to the end 200 of the fixed guide 20, at the opposite side with respect to the first 50a and transmitted by means of the pulley 61 hinged at the upper end 31 of the handlebar 30 downwards, along the handlebar 30. The rope 51 a that originates from the pulley 61, is therefore transmitted upwards by means of the pulley 62 that is hinged at the lower end 32 of the handlebar 30, then fixed with its head 511 a to the head module 41 of the net-guiding chain 40 like for the rope 50a.

[0025] In the mosquito-net 1b in figure 2 a second driving device solution of the net-guiding chain 40 of the type with two ropes 50b and 51 b is shown. More particularly, it comprises essentially of a rope 50b that is with the end 500b engaged at the end 201 of the fixed guide 20 and transmitted by means of a pulley 60 hinged at the upper end 31 of the handlebar 30, downwards, along the said handlebar 30 to be fixed with the head 501 b to the head module 41 of the net guiding chain 40. The second rope 51 b is engaged with the head 510b at the upper end 31 of the handlebar 30 to horizontally protract along the fixed guide 20 until it intercepts the gear-wheel 70 placed at the end of the roller or a part of the same contained inside the roller shutter box 10. In more detail, the rope 51 b, or rather at least one part of the same, is characterised by ball-like elements 520, that engage the gear-wheel 70, in such a way as to prevent sliding, by overcoming the

resistance to the rotation that is exercised by the helical spring, not illustrated, that cooperates with the roller placed in the roller shutter box 10. The head 511 b of the second rope 51 b that originates from the gear-wheel 70 is transmitted by means of the pulley 61, hinged at the upper end of the handlebar 30, downwards along the handlebar 30, in order to be transmitted upwards by means of the pulley 62 that is hinged below at the handlebar 30, and then again transmitted downwards turning around the pulley 63 joined to the head module 41 of the net-driving chain to finally be fixed in the lowerside 32 of the handlebar 30.

[0026] The mosquito-net 1 c shown in figure 3, is configured as a third driving device solution of the net guiding chain 40. It is a mono-rope device 50c whose head 500c is engaged at the end 201 of the fixed guide 20 and transmitted by means of the pulley 60 hinged at the upper end 31 of the handlebar 30, downwards, along said handlebar 30, to engage at the lower end 32 a gear-wheel 80 that transmits the rope 50c upwards along the handlebar 30. The rope portion 50c that originates from the gear-wheel 80 is then sent along the fixed guide 20, by means of the pulley 61 hinged at the end upper 31 of the handlebar 30, so that the second head 501 c fixes at the end 200 of the fixed guide 20. In this case, the movement of the handlebar 30 on the horizontal-plane, involves the rotation in one or in the other way of the gear-wheel 80, which peripherally insists on the upper and countershaped profile of the net guiding chain 40, determining its deposition and vice-versa. Also in that case, so as to avoid the sliding of the rope 50c, at least one portion of the same is made of elements 520 which are able to engage said gear-wheel 80.

[0027] The mosquito-net 1 d of figure 4, relates to a fourth driving device solution of the net guiding chain 40. Also in this case, it is a mono-rope device 50d whose head 500d is engaged at the upper end 31 of the handlebar 30 and transmitted by means of the pulley 64 hinged at the end 201 of the fixed guide 20, along said handlebar 30. More particularly the rope 50d, that originates from the pulley 64 is sent towards an additional pulley 60 hinged at the upper end 31 of the handlebar 30 that provides for the transmission of the rope 50d towards the lower end 32 of the handlebar 30, where it engages a gear-wheel 80 also of the reduction type. The gear-wheel 80 transmits the rope 50d upwards, along the handlebar 30 to turn around the pulley 61, hinged at the upper end 31 of the handlebar 30. From the pulley 61, the rope 50d protracts along the fixed guide 20, until the end 200, where it intercepts the gear-wheel 70 positioned at the end of the roller or a part of the same contained inside the roller shutter box 10 like for mosquito-net solution 1d, and then with the head 501 d that turns around the gear-wheel 70 to be transmitted to the end 31 of the handlebar 30 where it is fixed. At least one part of the rope 50d is characterised by elements 520 that engage the gear-wheel 70, in such a way as to prevent the sliding, by overcoming the resistance to the rotation that is exer-

cised by the helical spring, not illustrated, and that cooperates with the roller placed in the roller shutter box 10. Also in this case, the movement of the handlebar 30 on the horizontal-plane involves the rotation of the gear-wheel 80 in one or in another way, which peripherally insists on the upper and countershaped profile of the net guiding chain 40, determining its deposition and vice-versa.

10 Reference

[0028]

1a, 1b, 1 c, and 1d mosquito-net

15 10 vertical roller shutter box, upper end 101, lower end 100

20 fixed horizontal upper guide, end 200, 201

30 vertical handlebar; upper end 31, lower end 32

20 40 net guiding chain, first end 400, second end 401, modules 41

50a rope, heads 500a - 501 a

50b rope, heads 500b - 501 b

60 pulley

51 a rope, heads 510a, 51 1 a

25 51 b rope, heads 510b-511b

61 pulley

62 pulley

63 pulley

64 pulley

30 70 gear-wheel

80 gear-wheel

520 elements of the rope 51 b, 50c, 50d

50c rope, heads 500c-501 c

50d rope, 500d-501 d.

Claims

1. Mosquito-net with net-guiding chain driving device for net with horizontal sliding, **characterised by** hav-

a) a vertical roller shutter box 10, lateral as compared to a horizontal and fixed upper guide 20, containing the roller of the net; said net is joined with a first end to the roller;

b) a horizontal and fixed upper guide 20, joined with one end 200 at the upper end 101 of the vertical roller shutter box 10;

c) a vertical handlebar 30 to which the second end of the net is joined; the handlebar 30 being with the upper end 31 fixed and mobile longitudinally as to the fixed guide 20;

d) a net guiding chain 40 with containing seat of the lower border of the net; the net guiding chain 40 consisting of modules 41 reciprocally interconnected, where said net guiding chain 40, is with a first end 400 engaged at the lower end

- 100 of the roller shutter box 10, while the second end 401 slides inside the handlebar 30;
 e) a driving device of the net guiding chain 40, comprising at least a rope 50a, 50b, 50c, 50d, 51a, 51 b and at least one relative connection means 60, 61, 62, 63, 64, placed inside the handlebar 30 and fixed upper guide 20.
2. Mosquito-net with net-guiding chain driving device for net with horizontal sliding, according to claim 1, **characterised in that** the roller of the net contained in the roller shutter box 10 includes a helical charging spring, and has a gear-wheel 70.
 3. Mosquito-net with net-guiding chain driving device for net with horizontal sliding, according to claim 1, **characterised in that** in the underside of the handlebar 30 is hinged a gear-wheel 80 which peripherally insists on the upper and countershaped profile of the net guiding chain 40.
 4. Mosquito-net with net-guiding chain driving device for net with horizontal sliding, according to claim 1 **characterised in that** the mosquito-net 1a has the net-guiding chain driving device 40 that is composed by two ropes 50a-51 a, the first of which 50a is with the end 500a engaged at the end 201 of the fixed guide 20 and by means of a pulley 60 hinged at the upper end 31 of the handlebar 30 transmitted along the handlebar 30 to be fixed with the head 501 a to the head module 41 of the net guiding chain 40; the second rope 51 a is engaged with the end 510a at the end 200 of the fixed guide 20, at the opposite side respect to first 50a one and transmitted by means of the pulley 61 hinged at the upper end 31 of the handlebar 30 downwards, along the handlebar 30, so that the rope 51 a that originates from the pulley 61, is transmitted upwards by means of the pulley 62 and is hinged at the lower end 32 of the handlebar 30, then fixed with the head 511 a to the head module 41 of the net guiding chain 40 like for the rope 50a.
 5. Mosquito-net with net-guiding chain driving device for net with horizontal sliding according to claim 1 and 2, **characterised in that** the mosquito-net 1b has the net-guiding chain driving device 40 with two ropes 50b and 51 b, the rope 50b is with the end 500b engaged at the end 201 of the fixed guide 20 and transmitted by means of a pulley 60 hinged to the upper end 31 of the handlebar 30, downwards along said handlebar 30 to be fixed with the head 501 b to the head module 41 of the net guiding chain 40; the second rope 51 b is engaged with the head 510b at the upper end 31 of the handlebar 30 to be horizontally protracted along the fixed guide 20 up to intercept the gear-wheel 70 positioned at the end of the roller or a part of the same contained inside the roller shutter box 10; the head 511 b of the second rope 51 b that originates from the gear-wheel 70 is transmitted by means of the pulley 61, hinged at the upper end of the handlebar 30, downwards along the handlebar 30, to then be transmitted upwards by means of the pulley 62 that is hinged below to the handlebar 30, and then again transmitted downwards turning around the pulley 63 integral with the head module 41 of the net guiding chain to be fixed in the underside 32 of the handlebar 30.
 6. Mosquito-net with net-guiding chain driving device for net with horizontal sliding according to claim 1 and 3, **characterised in that** the mosquito-net 1 c has the net-guiding chain driving device 40 consisting of a mono-rope 50c whose head 500c is engaged at the end 201 of the fixed guide 20 and transmitted by means of the pulley 60 hinged at the upper end 31 of the handlebar 30, downwards, along the said handlebar 30, to engage a gear-wheel 80 at the lower end 32 that transmits the rope 50c upwards along the handlebar 30; the rope portion 50c that originates from the gear-wheel 80 is transmitted along the fixed guide 20, by means of the pulley 61 hinged at the upper end 31 of the handlebar 30, so that the second head 501 c is engaged at the end 200 of the fixed guide 20.
 7. Mosquito-net with net-guiding chain driving device for net with horizontal sliding according to claim 1, 2 and 3, **characterised in that** the mosquito-net 1 d has the net-guiding chain driving device 40 made up of a rope 50d with the head 500d engaged at the upper end 31 of the handlebar 30 and transmitted by means of the pulley 64 hinged at the end 201 of the fixed guide 20, along said handlebar 30; the rope 50d, that originates from the pulley 64 is transmitted towards an additional pulley 60 hinged at the upper end 31 of the handlebar 30 that provides for transmitting the rope 50d towards the lower end 32 of the handlebar 30, where it engages a gear-wheel 80 also of the reduction type; the gear-wheel 80 transmits the rope 50d upwards, along the handlebar 30 for turning around the pulley 61, hinged at the end upper 31 of the handlebar 30, and in which from the pulley 61 the rope 50d protracts along the fixed guide 20, up to the end 200, where it intercepts the gear-wheel 70 positioned at the end of the roller or a part of the same contained inside the roller shutter box 10, and therefore with the head 501 d that moves round to the gear-wheel 70 to be transmitted to the end 31 of the handlebar 30 where it is fixed.
 8. Mosquito-net with net-guiding chain driving device for net with horizontal sliding according to claim 1, 2, 5 and 7, **characterised in that** at least one part of the rope 51 b, and 50d consists of chained elements 520 that engages the gear-wheel 70.

9. Mosquito-net with net-guiding chain driving device for net with horizontal sliding according to claim 1, 3 and 6, **characterised in that** at least one part of the rope 50c consists of chained elements 520 that engages the gear-wheel 80.

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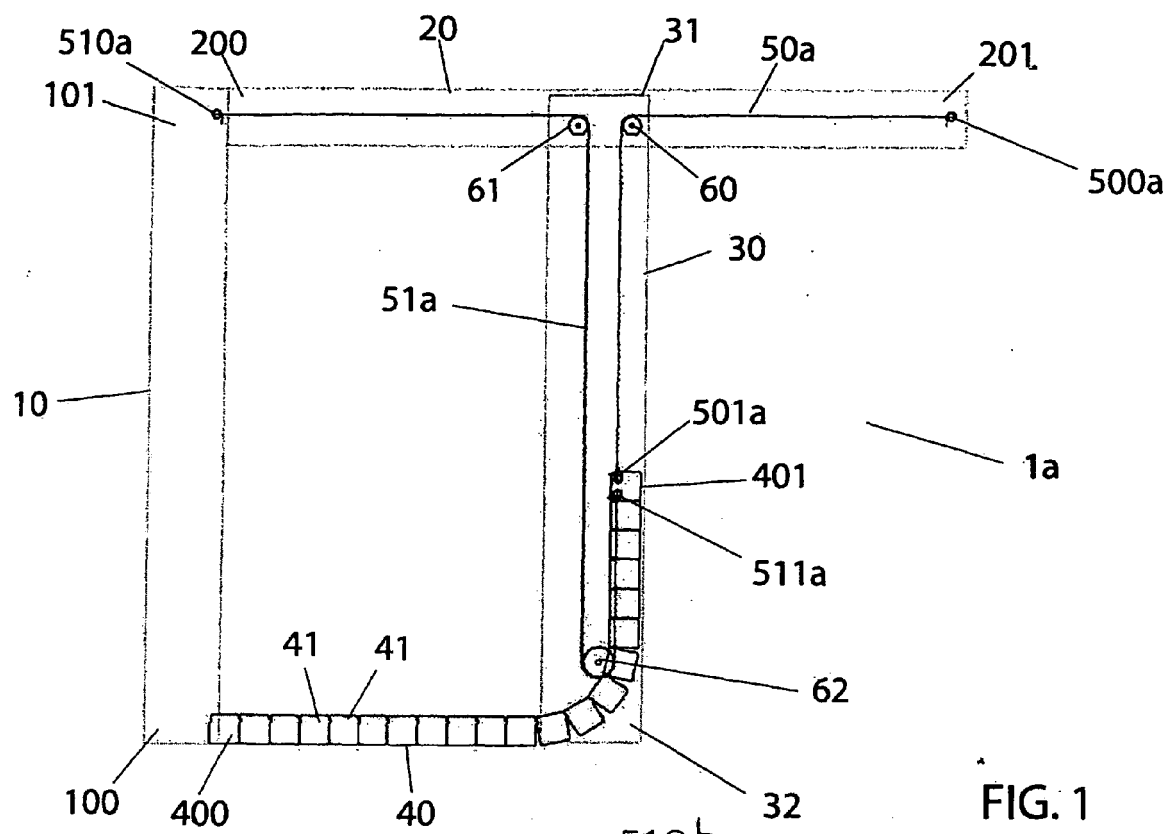


FIG. 1

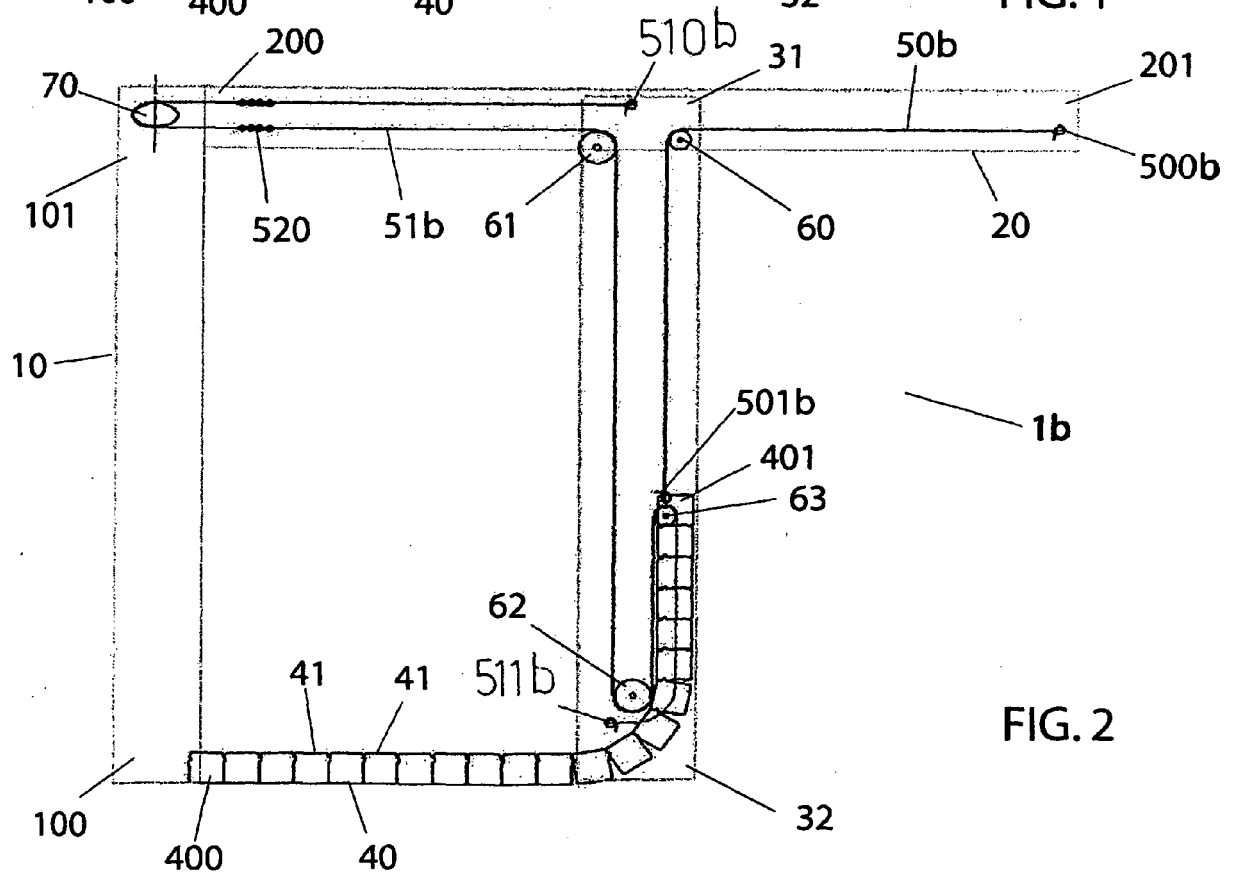


FIG. 2

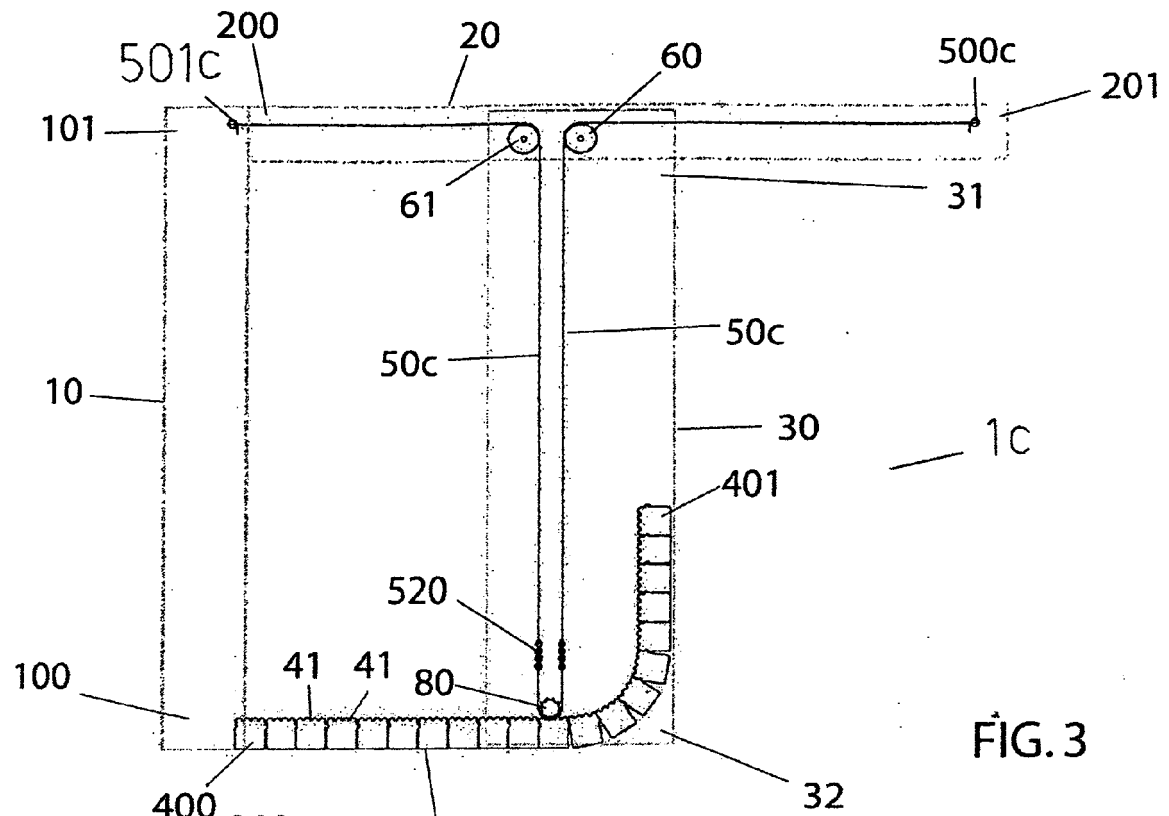


FIG. 3

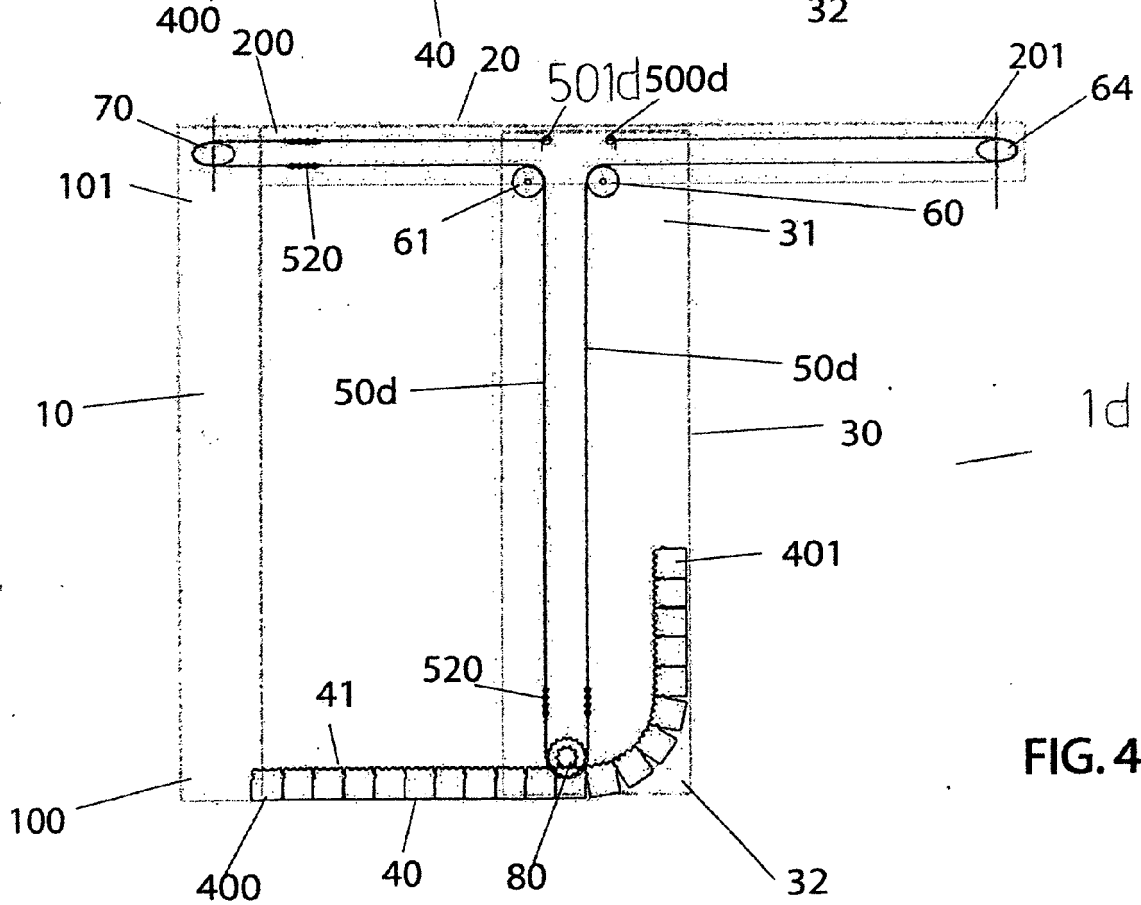


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 09 00 1216

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Place of search The Hague		Date of completion of the search 7 May 2009	Examiner Cornu, Olivier
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 09 00 1216

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