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(54) **Cable arrangement for actuating a horizontally sliding mosquito screen**

(57) The application concerns an anti-mosquito roller screen which is horizontally slidable. The arrangement has a movable vertical stile which is connected to an upper horizontal rail and comprises the handle. Inside the stile a flexible chain is housed which is inserted or retracted when closing or opening the screen and which serves as the lower frame part of the screen. In particular the application describes the arrangement and pre-tensioning of the cable which is invisibly housed in the frame parts and connects the chain to the screen roller.

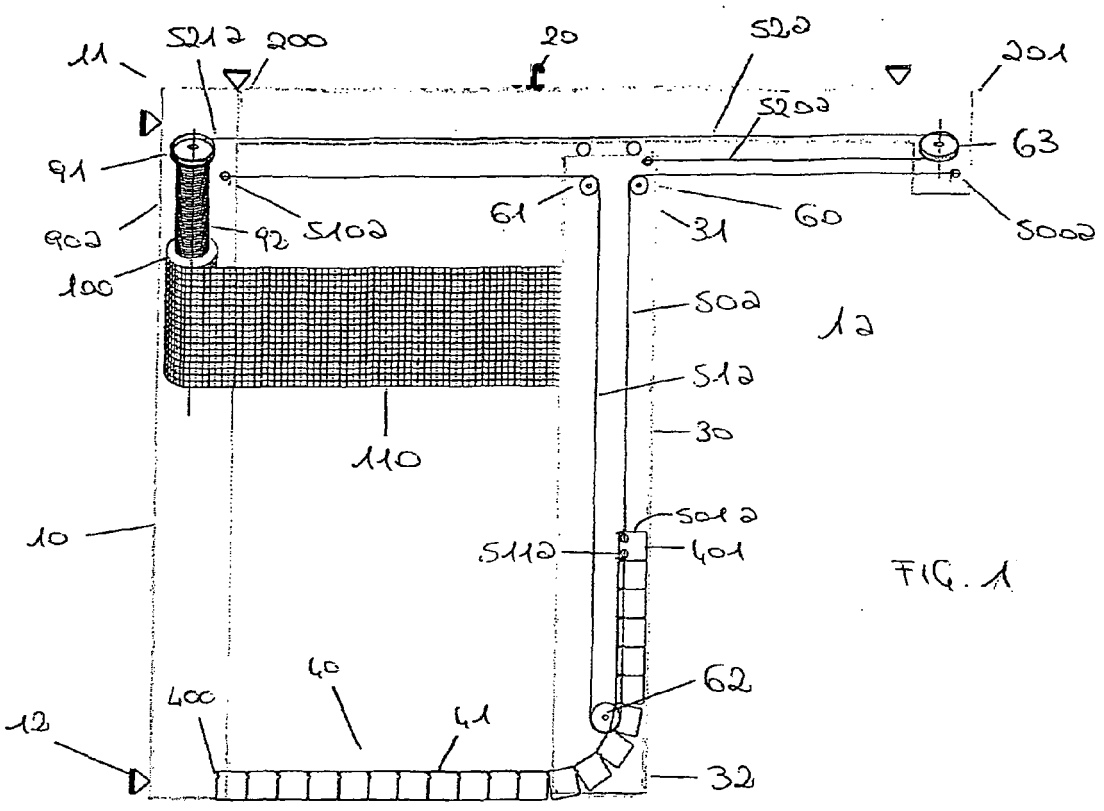

FIG. 1

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Description

[0001] The present invention relates to a tensioned cables guiding system to move a horizontally sliding protection net with handle bar in a mosquito-net with dragging device of the net driving chain.

Application field

[0002] The invention finds particular although not exclusive application in the field of the components and accessories for windows and door frames, as the mosquito-nets, for example the mosquito-nets for horizontally sliding doors and windows, intended to prevent the entry of insects inside the conventionally inhabited places, both houses and offices.

[0003] In the mosquito-nets, it is possible to find some common embodiment elements, which can be identified as the cased frame, generally of the type formed by a section or extruded bar made of aluminium, inside of which the winding reel of the net of the mosquito-net is coaxially inserted which holds a first end of said net. Across said cased frame, from a longitudinal opening, the net exits which has its second end joined to a handle bar which is movable in an approaching and in a moving away motion with respect to the cased frame. In some of the solutions, the winding reel can also comprise a corresponding preloaded return spring.

[0004] Of course, variations are also known, as for example mosquito-nets which instead of sliding in a vertical direction, slide in a horizontal direction, causing the handle bar to perform a translation movement which is intended to pull the net along a horizontal axis. From the structural point of view, said mosquito-nets look very similar to the just described solutions and they are frequent in the roller curtains as well as, finally, in the sunshade screens. For example, one of these is relative to less valuable mosquito-nets without the internal preloaded spring. The latter are different from the first ones, because they require manual operations to unwind the net from the roller as well as to wind it back. In one case, for example, a closed circuit chain is usually used, which at one side engages with a wheel or pulley which is keyed to the corresponding winding reel which is housed inside a cased frame, determining in controlled way, the winding or vice-versa, of the net of the mosquito-net.

[0005] Said prior art mosquito-net solutions, with vertically or horizontally sliding net, are therefore formed in the following way:

a) a cased frame, which is closed at the ends by corresponding heads;
b) a winding reel, inside said cased frame, which is supported at the ends by a couple of heads, which are engaged at the end of the cased frame;
c) a possible helicoidal torsion spring which is coaxially placed and which cooperates with said winding reel;
d) a net, which is anchored at one side to said winding reel and which at the other one is joined to a handle bar;
e) and finally, reciprocally parallel guides, inside of which the ends of said handle bar and the sides strips of the net are slidable.

Prior art

[0006] In literature different solutions can be found relatively to the horizontal movement of the net of the mosquito-net. For example in EP753642 (Metaco) a screen apparatus is described which comprises a foldable screen having a base side, a left side and a right side, the screen being longitudinally extended between an upwards extending left frame element and an upwards extending right frame element, which are longitudinally movable one another in order to open the foldable screen, the apparatus further including a longitudinally extending guiding element of the top and a longitudinally extending base guiding element, each of the guiding elements being flexible and bent in a transversal direction and being adjacent to one of the right and left frame elements thus having a free end which moves in an upward direction and in a downward direction with respect to said one of the right and left frame elements when the screen is opened or closed, each of the guiding elements having a flexural elasticity which involves an elastic return force, characterised in that the free end of each of the guiding elements slides along said one of the right or left frame elements, in that the other end of each of the guiding elements is fixed to the other one of the right and left frame elements, and in that the left frame element, the right frame element, the guiding element of top and the base guiding element form a frame.

[0007] EP 999335 (Metaco) describes a screen apparatus comprising:

- a pair of screen mounting frames disposed opposite to each other, at least one of which is slidable;
- a screen mounted between said screen mounting frames so as to be capable of being opened and closed;
- a sliding guiding frame disposed near a side of said screen which is not connected to the screen mounting frame, at least one end of which frame is a free end which is capable of being received in and withdrawn from inside of one of said screen mounting frames;

said guiding frame being formed of a plurality of interconnected rigid units each of which has a pair of sidewalls, disposed opposite to each other, and a bridging portion interconnecting said sidewalls, adjacent rigid units being rotatable relative to each other whereby the sliding guiding frame is bendable; stopper means associated with said rigid units, said stopper means preserving straightness of a withdrawn portion of the sliding guiding frame when the sliding guiding frame is withdrawn from the screen mounting frame in accordance with sliding movement of the slidable screen mounting frame.

[0008] Guides consisting of consecutively interconnected rigid units are known. In JP 53-51648 one can observe the guide formed by consecutively hinged rigid units, a portion of which extends in a parallel way with respect to the edges of the screen. An end of the structure formed by the concatenated portions is received in and withdrawn from inside the screen mounting frame, which is represented by the roller shutter box or cased frame. In JP 06-158961, one can infer that it proposes the use of foldable guiding structures which are formed by consecutively interconnected rigid units, which extend along the opposite edges of a screen and having end parts which are arranged to be withdrawn from and received in one of the stanchions of the framework. It clearly relates to a shielding device having a screen extending between a fixed stanchion and a movable stanchion. Along each of the opposite horizontal edges of the screen a flexible guiding structure is located which consists of a plurality of rigid units which are pivotally connected the one after the other by means of pins. The guiding structure, which is engaged in a sliding way along a fixed section, has one end which is fixed to the movable stanchion and an end part which is guided in a sliding way along a shaped prolongation of the section. The guiding structure therefore maintains a rectilinear development in the part extracted from the fixed stanchion, and it bends at an input opening in the stanchion to be received in and withdrawn from the same according to the opening and closing movement of the screen.

Prior art closest to the invention

[0009] Following a wider research, some horizontally sliding mosquito-net solutions have been found which can apparently be considered closest to the object of the present invention. More in detail, said prior art solutions are:

D1 WO2004/104357 (Seiki)
D2 TV2008A000021 (Bettio)

[0010] In D1 a mosquito-net is described having a net with a net driving chain, as a guiding device of a horizontally sliding net. In particular, one of the aims of the invention is to supply a winding-up screen device so that, when the screen is wound around the winding axis, a screen guide guides the edge portion of the screen which is unwound from the winding-axis to obtain the opening. The device of the winding-up screen contains a fixed frame leaning against an opening frame of a building; a movable frame provided so as to be parallel with respect to the fixed frame and movable frame; a groove of the screen which is wound with respect to a winding axis, the screen developing between the fixed frame and the movable frame to be opened and closed winding and unwinding the screen with respect to the winding axis by the forward and reverse motion of the movable frame; and a screen guide formed so as to be long and bendable, going in and coming out of the inner portion of the fixed frame or the movable frame, the exiting from the end portion of the fixed frame or from the movable frame linearly occurring on the outside. A portion of the guide is fixed to the screen along the edge portion to be guided by the screen guide, the screen guide contains a plurality of guide parts in which a groove is provided in the axial direction on the inner surface disposed on the screen side and is formed by connecting neighboring guide parts at both sides sandwiching the groove so as to be bendable.

[0011] In D2 a mosquito-net is described which includes:

(a) a vertical cased frame for a winding roller, which is lateral with respect to an upper guide which is fixed at the beam, where said cased frame contains the winding roller of the net; said net is joined with a first end to the winding roller;
(b) an upper fixed horizontal guide, joined to an end at the top portion of the cased frame;
(c) a vertical handle bar, to which the second end of the net is joined, the handle bar having upper portion which is fixed and longitudinally movable with respect to the fixed guide;
(d) a driving chain, which contains seats for the lower edge of the net; the driving chain consisting of reciprocally interconnected modules, wherein said net driving chain is engaged with a first end to the underside of the cased frame, while the second end slides inside the handle bar;
(e) a guiding device of the driving chain, comprising a rope and relative connecting means, located within the handle bar and in the fixed upper guide.

[0012] In conclusion one can reasonably consider known a mosquito-net, in which the protection net, which is wound around a winding shaft or reel inside the vertically placed cased frame, it is pulled along a horizontal axis by means of a handle bar which slides by means of a manual movement, moving away and approaching with respect to said vertical

cased frame, said handle bar laying down along its path a driving chain which holds the lower edge of the protection net, the top edge of said protection net being slidable inside a fixed guide, wherein said driving chain is driven by the guiding device which includes at least one rope and connecting means with relative transmissions, which are located within the handle bar and in the fixed upper guide.

Drawbacks

[0013] From the functional point of view, the represented solutions offer a good result, however they have some drawbacks, mainly relative to the movement of the handle bar which provides the laying phase and vice-versa of the protection net of the mosquito-net. In other words, during the usual use it is not always easy to move it, which is a circumstance which appears to be mainly due to a lack of a sufficient tensioning of the movement cables. This a little or insufficient tension of the movement cables or ropes involves, during the movement phase of said handle bar, clearances, shakings, which impact on the whole structure of the mosquito-net, and in particular interfering with the surfaces inside the upper fixed guide as well as of the handle bar, these being all circumstances which increase the friction in certain way. To these facts a certain noisiness must be added, which beside disturbing the user induces the user to consider the product as being a poor quality one. The disadvantage could partly be limited, providing a proper adjustment of the cables or ropes of the guiding device, this however seeming not applicable because of physiological stretching the cables are subject to, and because of the allowances which influence the assembly and the details of the mosquito-net itself, or anyway it does not guarantee in the course of time a perfect operation of the opening and closing mechanism of the protection net of the mosquito-net. One could suppose to use cables with a low elongation coefficient, however apart from the objective cost, this would not definitively solve the problem simply because however they would need a proper adjustment during the installation of the mosquito-net, the latter being an operation requiring some time and a highly specialized staff.

[0014] The lack of a proper and constant tension of the cables, therefore of the unwinding and vice-versa mechanism of the net of the mosquito-net, involves a significantly lower stability of the assembly of the mosquito-net, with the presence of an excessive clearance which can above all be noticed at the lower guide, which can tend to lose its necessary straightness during its unwinding even up to not coincide with the handle bar in correspondence of the stanchion with rabbet profile with respect to which the handle bar stops in a condition corresponding to the complete laying out of the protection net.

[0015] As a whole, from these introductive considerations, one can perceive that it is certainly needed to find alternative solutions.

[0016] The aim of the present invention is also to remedy the above-mentioned drawbacks.

Summary of the invention

[0017] This and other aims are reached by the present invention according to the characteristics as for the included claims, solving the abovementioned problems by means of a tensioned cables guiding system to move the horizontally sliding net with handle bar in a mosquito-net with controlled dragging device of the net driving chain, comprising:

(a) a vertical cased frame, which is lateral with respect to an upper fixed horizontal guide, which contains the winding roller of the protection net; said net is joined with a first end to said winding roller;
(b) an upper fixed horizontal guide, joined at one end to one upper end of the cased frame;
(c) a vertical handle bar, to which the second end of the protection net is joined, the handle bar having the upper end constrained to the fixed guide which is longitudinally movable with respect to said fixed guide;
(d) a lower net driving chain with a containment seat of the lower edge of the net; the net driving chain consisting of reciprocally interconnected modular elements, wherein said net driving chain is engaged with a first end to the underside of the cased frame, while the second end slides inside the handle bar;
(e) a dragging device of the net driving chain, comprising at least cables and corresponding transmission means, located within the handle bar and in the fixed upper guide;

and with, inside the vertical cased frame, at the upper end of the winding roller of the protection net which is contained inside said cased frame, a winding sprocket or reel is present which is provided with an elastic return spring, to said winding sprocket or reel a cable of the dragging device being constrained, in such a way that, translating the handle bar which drags the net driving chain and the protection net of the mosquito-net, the cables of said dragging device constantly remain in a tensioned condition.

Aims and advantages

[0018] In this way, by means of the considerable creative contribution whose effect constitutes an immediate technical progress, multiple advantages are achieved.

[0019] A first and important value, with respect to the conventional mosquito-nets, consists in the fact that the net which is not provided with a lower guide and provided with said tensioned cables guiding system, is provided with a particularly soft movement requiring only a little force to the user who can move the handle bar in an approaching and in a moving away motion, with an unusual fluency and silent way due to a lower friction.

[0020] With respect to the prior art solutions, providing the winding sprocket or reel, inside the cased frame, which constantly maintains in a tensioned condition at least one first cable of the dragging device, allows a better stability of the assembly of the mosquito-net, with a significant reduction of the total clearances, and in particular stressing in a lower way the net driving chain which does not undergo significant shakings allowing a perfect alignment of the handle bar with respect to the rabbet and closure stanchion section. Moreover, in an extended condition said solution contributes to provide greater guarantees of effectiveness in maintaining in a tensioned condition and in a uniform way also the protection net, even if it is subject to a persisting pressure - the known sail effect - which is applied on the surface of the same.

[0021] Still, the presence of the winding sprocket or reel, which allows a constant tension of the cables, cords or ropes of the dragging device, is easily installable because it does not need particular adjustment works and it does not require any particular maintenance.

[0022] These and other advantages will be apparent from the following detailed description of some preferred embodiments with the aid of the enclosed schematic drawings whose embodiment details are not to be considered limitative but only illustrative.

Content of the drawings

[0023]

Figure 1 represents a view of the tensioned cables guiding system of the handle bar and of the protection net in a horizontally sliding mosquito-net, with a first embodiment of the dragging device of the net driving chain which is provided with a cables tensioning sprocket or reel;

Figure 2 represents a view of the tensioned cables guiding system of the handle bar and of the protection net in a horizontally sliding mosquito-net, with a second embodiment of the dragging device of the net driving chain which is provided with a tensioning sprocket or reel of the cables a first one of which is a chain;

Figure 3 is a view of the tensioned cables guiding system of the handle bar and of the protection net in a horizontally sliding mosquito-net, with a third embodiment of the dragging device of the net driving chain which is provided with a tensioning sprocket or reel of the cables a first one of which is a chain, as change of the guiding system as for Figure 2.

[0024] Finally, also Figure 4 is a tensioned cables guiding system of the handle bar and of the protection net in a horizontally sliding mosquito-net, with a fourth embodiment of the dragging device of the net driving chain which is provided with a cables tensioning sprocket or reel.

Practical embodiment of the invention

[0025] With reference to Figures 1-4, the mosquito-net (1a, 1b, 1 c, 1d) substantially consists of a vertical and lateral cased frame (10), inside of which a vertical winding roller (100) is housed, a corresponding protection net or screen (110) which, through a slit longitudinally obtained with respect to said cased frame (10), unwinds spreading out and vice-versa along a horizontal axis. Said protection net or screen (110) has a first end joined to said winding roller (100) and around which it is wound to be unwound exiting sideways from said cased frame (10) through said longitudinal slit. In one case, the winding roller (100) can also be provided with a preload helicoidal spring, which is constrained with one of the ends to said winding roller (100), in such a way that, on the one hand unwinding the net or screen (110), also the winding roller (100) rotates involving the torsional loading of the helicoidal spring, not illustrated, and the consequent tensioning of the protection net (110). At the upper end (11) a fixed horizontal upper guide (20) with two ends (200, 201) is orthogonally joined to the vertical cased frame (10), respectively a right and a left end, along which and in correspondence of the bottom side of which the vertical handle bar (30) is longitudinally movable, in an approaching and in a moving away motion, the handle bar being perpendicularly constrained with the upper end (31) with respect to said fixed guide (20), in such a way that it slides in a longitudinally driven way with respect to said fixed guide (20).

[0026] The tensioned cables guiding system provides that at the lower end (12) of the cased frame (10), a first end (400) of the net driving chain (40) is engaged, which consists of a series of reciprocally hinged rigid modules (41), wherein

the length of the net driving chain (40) is at least equal to the width of the span to be closed by means of the installation of the mosquito-net (1 a, 1b, 1c, 1 d). The second end (401) of the net driving chain (40) vertically slides in a controlled way inside the handle bar (30) which is substantially hollow, entering in correspondence of the base (32) in order to be then vertically driven. More in detail, the second end of the protection net or screen (110) is engaged to the handle bar (30), the first end of the protection net or screen, as previously explained, is engaged to the winding roller (100) of the cased frame (10). In this way, moving the handle bar (30) in one direction or in the other one the contextual winding-unwinding is obtained to lay out the protection net (110) and the sliding inside the handle bar (30) of the net driving chain (40) by means of a dragging device which includes cables, chains, chain-cables (50a, 51 a, 52a, 50b, 51 b, 52b, 50c, 51c, 50d, 51 d, 52d), pulleys (60, 61, 62, 63, 64, 65 and 66), sprocket or reel (90a, 90b, 90c and 90d). During the unwinding movement and vice-versa of the protection net (110) its lower edge, longitudinally remains inside the profile of the modules (41) of said net driving chain (40) for the portion of the net driving chain (40) which rests on the support plane of said mosquito-net (1a, 1b, 1c, 1d).

[0027] In the tensioned cables guiding system for mosquito-net (1a) shown in Figure 1, the dragging movement of the net driving chain (40) is controlled by a dragging device which includes cables (50a, 51 a, 52a), pulleys (60, 61, 62, 63), sprocket or reel (90a). The first cable (50a) which is present also in the embodiments (1b, 1 c, 1 d), is partially placed along the fixed guide (20) and partially develops along the handle bar (30). The end (500a) of the cable (50a) is fixed to the end (201) of the fixed guide (20) and, by means of a pulley (60) hinged at the upper end (31) of the handle bar (30), it is transmitted along said handle bar (30) to be constrained by the head (501 a) to the head module of the second end (401) of the net driving chain (40). Concerning the second cable (51 a) it is also partially placed along the fixed guide (20) and partially along the handle bar (30), it is engaged with the end (51 0a) at the end (200) of the fixed guide (20), at the opposite side with respect to the end (201) and downwardly transmitted along the handle bar (30), by means of the pulley (61) hinged at the upper end (31) of the handle bar (30). The cable (51 a) coming from the pulley (61), is therefore upwardly transmitted by means of the pulley (62) which is hinged at the base (32) of the handle bar (30), therefore constrained with the head (511a) to the head module of the second end (401) of the net driving chain (40) as for the cable (50a). Finally, a third cable (52a) is placed inside the fixed guide (20), and it is constrained with the end (520a) at the upper end (31) of the handle bar (30) protracting until at the end (201) of the fixed guide (20) to be then transmitted along said fixed guide (20) by means of the pulley (63) and therefore to arrive to the sprocket or reel (90a) with respect to which it is wound by means of the pulley (91). In this case the reel (90a), which is joined to the winding roller (100) in the overhanging part, comprises at least a pulley (91) and a spring (92), in such a way that said pulley (91) is induced to rotate in one of the two directions due to the effect of the elastic return force, winding or unwinding the cable (52a) and therefore maintaining it in a constantly tensioned condition. In principle, the reel (90a) is mounted in the mosquito-net (1 a) in a preloaded condition of the spring (92) thus maintaining constant the tension of the third cable (52a) both in the case in which the handle bar (30) is in abutment with respect to the cased frame (20), corresponding to the maximum opening of the span, and in case in which the same is in a translated condition corresponding to the maximum opening of the protection net (110) therefore in abutment at the rabbet jamb, not illustrated, which is opposite with respect to the cased frame (20).

[0028] In the solution of tensioned cables guiding system for mosquito-net (1b) of Figure 2, a second solution for the dragging device of the net driving chain (40) is shown of the type illustrated as a variation of the solution of the mosquito-net (1a) of Figure 1. Also in this case, the dragging movement of the net driving chain (40) is identically controlled by a dragging device which includes three cables (50b, 51 b, 52b), pulleys (60, 61, 62, 63), sprocket or reel (90b). With respect to the solution of the mosquito-net (1a) of Figure 1, in the solution of the mosquito-net (1b), the difference consists in the fact that instead of the third cable (52a), a chain (52b) is used, consisting of links or spherical balls or equivalent elements, the one connected to the other by means of an intermediate connecting portion like a hinge which allows the adaptation of one independently with respect to the other ones, located at least for part of the length of said chain (52b). In other words the use of the chain (52b) is enough only for that part of its length which is involved in the action of the sprocket or reel (90b), the remaining portion being possibly involved by a conventional cable as well as the cable (52a). Consequently, the use of said chain (52b) requires a pulley (93) instead of the pulley (91) which is of the type with a "U" shaped groove, constrained to the spring (92), wherein said pulley (93) is peripherally counter-shaped depending on the links or spherical balls at least partially forming said chain (52b). Said chain (52b) has its ends engaged at the upper end (31) of the handle bar (30).

[0029] Figure 3, is a change of the dragging device with respect to the solution of Figure 2, in a tensioned cables guiding system for a mosquito-net (1c). The dragging movement of the net driving chain (40) is controlled by a dragging device which includes two cables, respectively (50c, 51c), pulleys (60, 61, 62, 64), sprocket or reel (90c). Also in this case, the first cable (50c) is configured and identically developed as the solution of Figure 1 and 2, and it cooperates with the use of a chain (51c) or a mixed cable-chain element, whose conformation with spherical balls is obtained at least for that part of its length which is involved in the action of the sprocket or reel (90c) in such a way that the remaining portion can be possibly involved by a conventional cable. Consequently, the use of said chain (51 c), similarly to what described relatively to Figure 2, requires a pulley (93) constrained to the spring (92), wherein said pulley (93) is peripherally

counter-shaped depending on the links or spherical balls at least partially forming said chain (51 c). About the path of the second cable (51 c) it is lightly different with respect to the previously illustrated configurations, also relatively to the part running inside the handle bar (30). In detail, the second cable (51 c) has a first head (510c) engaged at the upper end (31) of the handle bar (30) and then, it develops along the fixed guide (20), it turns around the reel (90c) and then it is downwardly transmitted along the handle bar (30). A pulley (64) is provided, which is sideways hinged to the head module of the second end (401) of the net driving chain (40), and around which the end portion (51 1 c) of said cable (51c) rotates coming from the pulley (62), going to be constrained at the base portion (32) of the handle bar (30).

[0030] Figure 4 is still another variation of the dragging device with respect to the solution of Figure 1, in a tensioned cables guiding system for a mosquito-net (1d). The dragging movement of the net driving chain (40) is controlled by a dragging device which includes three cables, respectively (50d, 51d, 52d), pulleys (60, 61, 62, 64, 65, 66), sprocket or reel (90d). Also in this solution the first cable (50d) is identically configured as the previous solutions of Figures 1-3. About the second cable (51 d) it has a path along the fixed guide (20) and partially along the handle bar (30). The cable (51d) is engaged with the end (510d) near the end (200) of the fixed guide (20), at the opposite side with respect to the end (201) and it is transmitted by means of the pulley (61) which is downwardly hinged at the upper end (31) of the handle bar (30), along the handle bar (30). The cable (51d) coming from the pulley (61) is therefore upwardly transmitted by means of the pulley (62) which is hinged at the base (32) of the handle bar (30), and then it is constrained with the head (511d) to the module (402) which precedes the head module of the net driving chain (40). In a similar way, the third cable (52d) presents a path along the fixed guide (20) and partially along the handle bar (30). The end (520d) of the cable (52d) is engaged at the base (32) of the handle bar (30) while the end (521 d) is engaged to the pulley (91) of the winding sprocket or reel (90d). The path of the cable (52d) starting from the end (520d) develops along the handle bar (30), it turns around the pulley (64) which is fixed on the head module of the second end (401) of the net driving chain (40). From this position, the cable (52d) goes downwardly and it turns around the pulley (65) which is fixed to the handle bar (30), and then it turns upwardly and it protracts along and up to in correspondence of the end (31) of the handle bar (30). After this, the cable (52d) turns around the pulley (66) which is hinged to the handle bar (30) toward the end (200) and along the fixed guide 20, to be then engaged with the end (521 d) to said winding sprocket or reel (90d).

[0031] In the solutions of tensioned cables guiding system for a mosquito-net (1a, 1b, 1c, 1d) the cable (50a, 50b, 50c, 50d) has a predetermined length according to the opening span of said mosquito-net (1a, 1b, 1c, 1d).

References

[0032]

(1a, 1b, 1c, 1d)	mosquito-net
(10)	lateral and vertical cased frame
(11)	upper end of the cased frame
(12)	lower end of the cased frame
(20)	horizontal fixed upper guide
(30)	vertical handle bar
(31)	upper end of the handle bar
(32)	base of the handle bar
(40)	net driving chain
(41)	chain modules
(50a, 51a, 52a, 50b, 51b, 52b, 50c, 51c, 50d, 51d, 52d)	cables
(60, 61, 62, 63, 64, 65 and 66)	pulleys
(90a, 90b, 90c and 90d)	sprocket or reel
(91)	pulley
(92)	spring
(93)	pulley
(100)	winding roller
(110)	protection net or screen
(200, 201)	end of the fixed guide
(400)	first end of the net driving chain
(401)	second end of the net driving chain
(500a)	end of the first cable (50a)
(501a)	head of the first cable (50a)
(510a, 510b, 510d)	end of the second cable
(511a)	head of the second cable

(520a, 520d, 521d) end of the third cable

Claims

1. Tensioned cables guiding system to move a horizontally sliding net with handle bar in a mosquito-net with dragging device of the net driving chain, comprising:

   a) a vertical cased frame (10), which is lateral with respect to the upper fixed horizontal guide (20), which contains the winding roller (100) of the protection net (110); said protection net (110) is joined with a first end to said winding roller (100);
   b) wherein, the upper fixed guide (20) is joined with the end (200) to the upper end (11) of the vertical cased frame (10);
   c) a vertical handle bar (30), to which the second end of the protection net (110) is joined; the handle bar (30) has the upper end constrained to the fixed guide (20) which is longitudinally movable with respect to said fixed guide (20);
   d) a net driving chain (40) with a containment seat of the lower edge of the protection net; the net driving chain (40) consisting of reciprocally interconnected modular elements (41), wherein said net driving chain (40) is engaged with a first end (400) to the underside of the cased frame, while the second end (401) slides inside the handle bar (30);
   e) a dragging device of the net driving chain, at least formed by cables and corresponding transmission means, located within the handle bar (30) and in the fixed upper guide (20);
   characterised in that, inside the cased frame (10), at the upper end of the winding roller (100) which is contained inside said cased frame (10), a winding sprocket, reel (90a, 90b, 90c, 90d) is present which is provided with an elastic return spring (92), at least one cable (52a, 52b, 51c, 52d) of the dragging device being constrained to said reel (90a, 90b, 90c, 90d), in such a way that, translating the handle bar (30) which drags the net guiding chain (40) and the protection net (110) of the mosquito-net (1a, 1b, 1c, 1d), the cables (50a, 51a, 52a, 50b, 51b, 52b, 50c, 51c, 50d, 51d, 52d) of said dragging device constantly remain in a tensioned condition.

2. Tensioned cables guiding system, according to claim 1, **characterised in that** the dragging movement of the net driving chain (40) in the mosquito-net (1a) is controlled by a dragging device which includes cables (50a, 51a, 52a), pulleys (60, 61, 62, 63), reel (90a), in which the cable (52a) is placed inside the fixed guide (20), and it is constrained with the end (520a) at the upper end (31) of the handle bar (30) protracting up to the end (201) of the fixed guide (20) to be then transmitted along said fixed guide (20) by means of the pulley (63) and therefore to arrive to the reel (90a) with respect to which it is wound by means of the pulley (91).

3. Tensioned cables guiding system, according to claim 1, **characterised in that** the dragging movement of the net driving chain (40) in the mosquito-net (1b) is controlled by a dragging device which includes cables (50b, 51b, 52b), pulleys (60, 61, 62, 63), reel (90b), wherein the cable (52b) at least partially consists of a chain which is constrained to the pulley (93) of the reel (90b), wherein said pulley (93), which is constrained to the spring (92), is peripherally counter-shaped with respect to the links which at least partially form said chain (52b), said chain (52b) having its ends engaged at the upper end (31) of the handle bar (30).

4. Tensioned cables guiding system, according to claim 1, **characterised in that** the dragging movement of the net driving chain (40) in the mosquito-net (1 c) is controlled by a dragging device which includes two cables, respectively (50c, 51 c), pulleys (60, 61, 62, 64), reel (90c), said cable (51c) having a first head (510c) engaged at the upper end (31) of the handle bar (30) and then developing along the fixed guide (20), turning around the reel (90c) and then being downwardly transmitted along the handle bar (30) wherein a pulley (64) is provided, which is sideways hinged to the head module of the second end (401) of the net driving chain (40), and around which the end portion (511c) of said cable (51c) rotates coming from the pulley (62), going to be constrained at the base portion (32) of the handle bar (30).

5. Tensioned cables guiding system, according to claim 1, **characterised in that** the dragging movement of the net driving chain (40) in the mosquito-net (1d) is controlled by a dragging device which includes three cables, respectively (50d, 51d, 52d), pulleys (60, 61, 62, 64, 65, 66), reel (90d), wherein the path of the cable (52d) which is constrained with the end (521d) to be wound to said reel (90d) and transmitted to the handle bar (30) by the pulley (66), starting from the end (520d) develops along the handle bar (30), it turns around the pulley (64) which is fixed on the head module of the second end (401) of the net driving chain (40), the cable (52d) then going downwardly and turning

around the pulley (65) which is fixed to the handle bar (30), and then it turns upwardly and it protracts along and up to the end (31) of the handle bar (30) towards the pulley (66) which is hinged to the handle bar (30).

6. Tensioned cables guiding system, for a mosquito-net (1a, 1b, 1c, 1d), according to the previous claims, **characterised in that** the reel (90a, 90b, 90c, 90d) which is joined to the winding roller (100) in the overhanging part and contained inside the cased frame (10), comprises at least a pulley (91, 93) and a spring (92), in such a way that said pulley (91, 93) is induced to rotate in one of the two directions due to the effect of the elastic return force, winding or unwinding the cable (52a, 52b, 51c, 52d) maintaining it in a constantly tensioned condition.

7. Tensioned cables guiding system, for a mosquito-net (1a, 1b, 1c, 1d), according to the previous claims, **characterised in that** the cable (50a, 50b, 50c, 50d) has a predetermined length according to the opening span of said mosquito-net (1a, 1b, 1c, 1d).

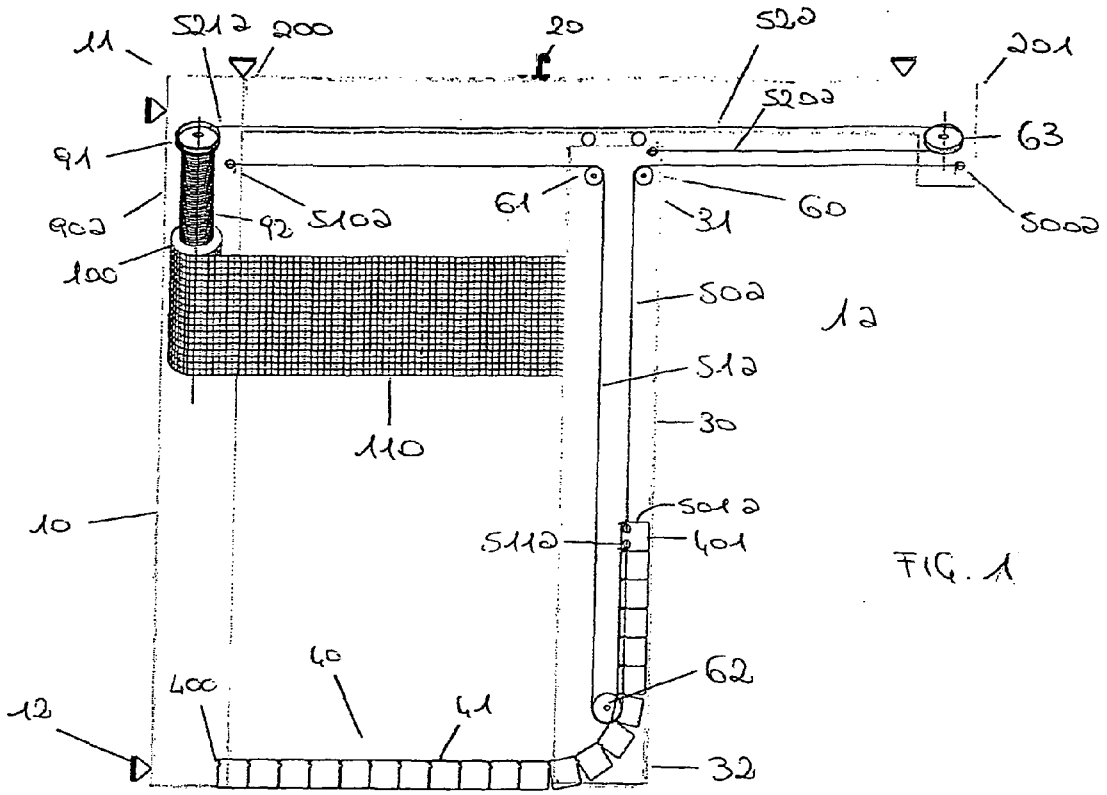
11
S212
200
20
S20
201
S202
63
91
902
92
S102
61
60
31
5002
100
502
12
S12
110
30
10
S112
401
62
40
400
41
12
32

FIG. 1

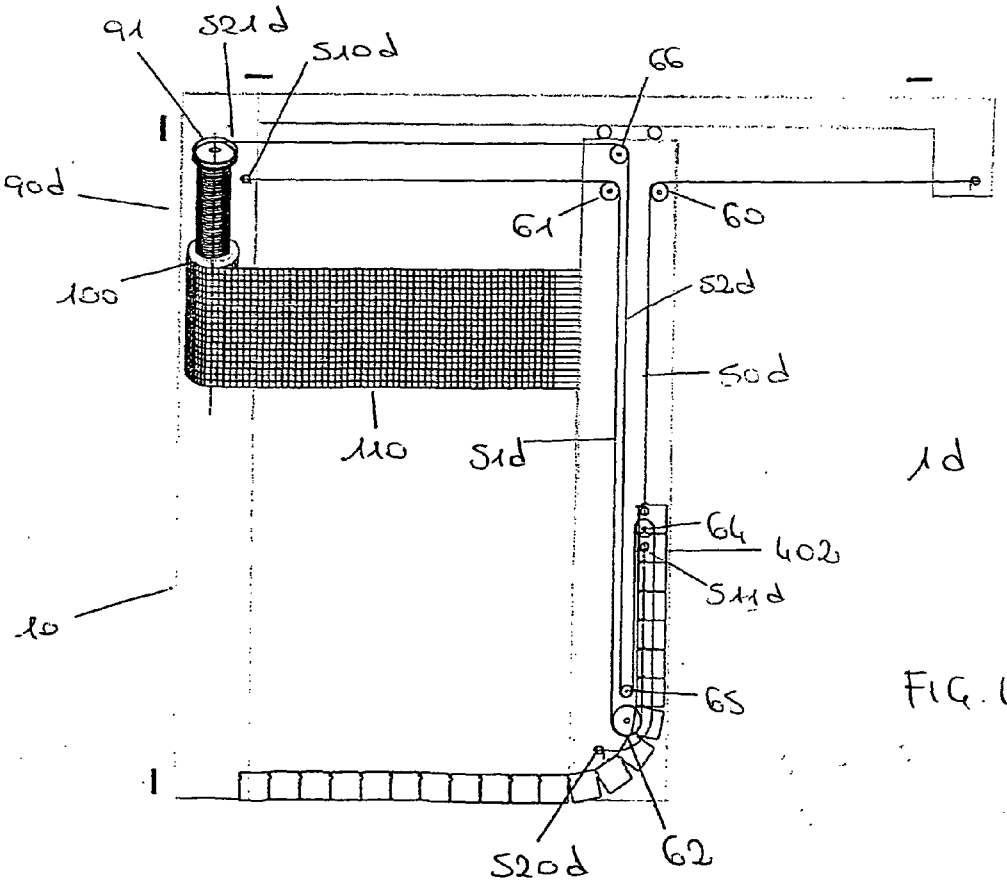
91
S21d
S10d
66
90d
61
60
100
S2d
S0d
110
S1d
1d
64
402
S11d
10
65
62
S20d

FIG. 4

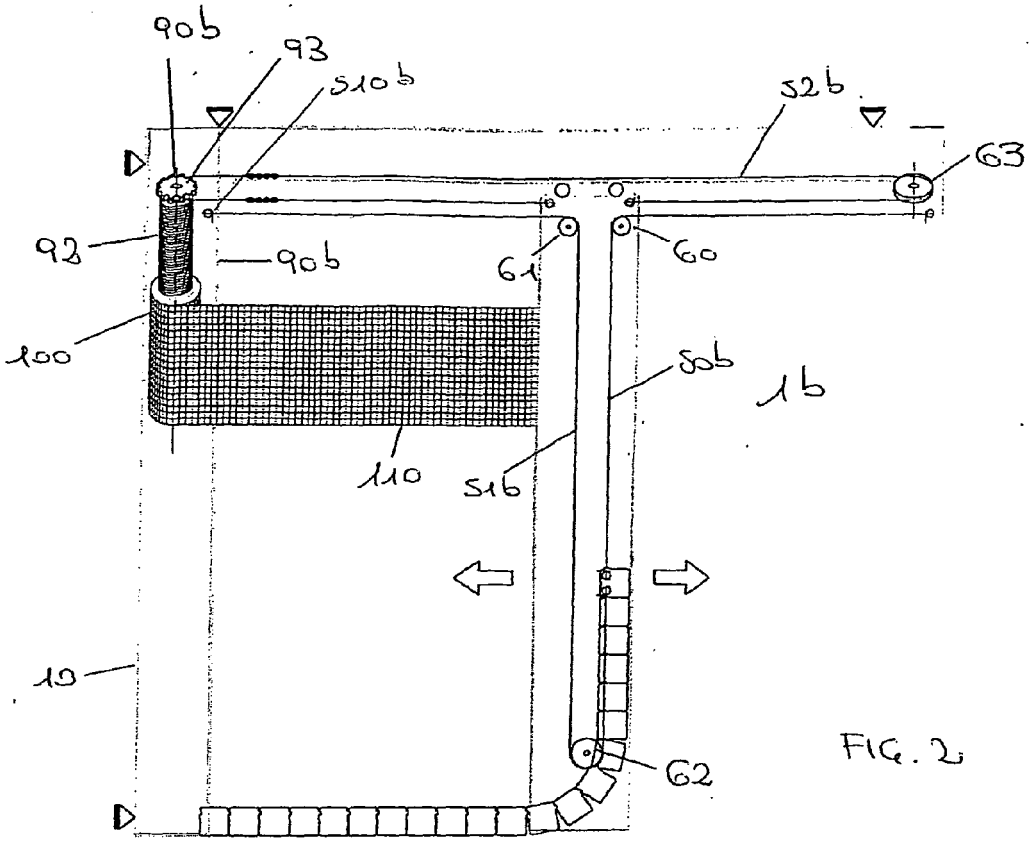
90b
93
S10b
S2b
63
92
90b
61
60
100
S5b
1b
110
S1b
10
62

FIG. 2

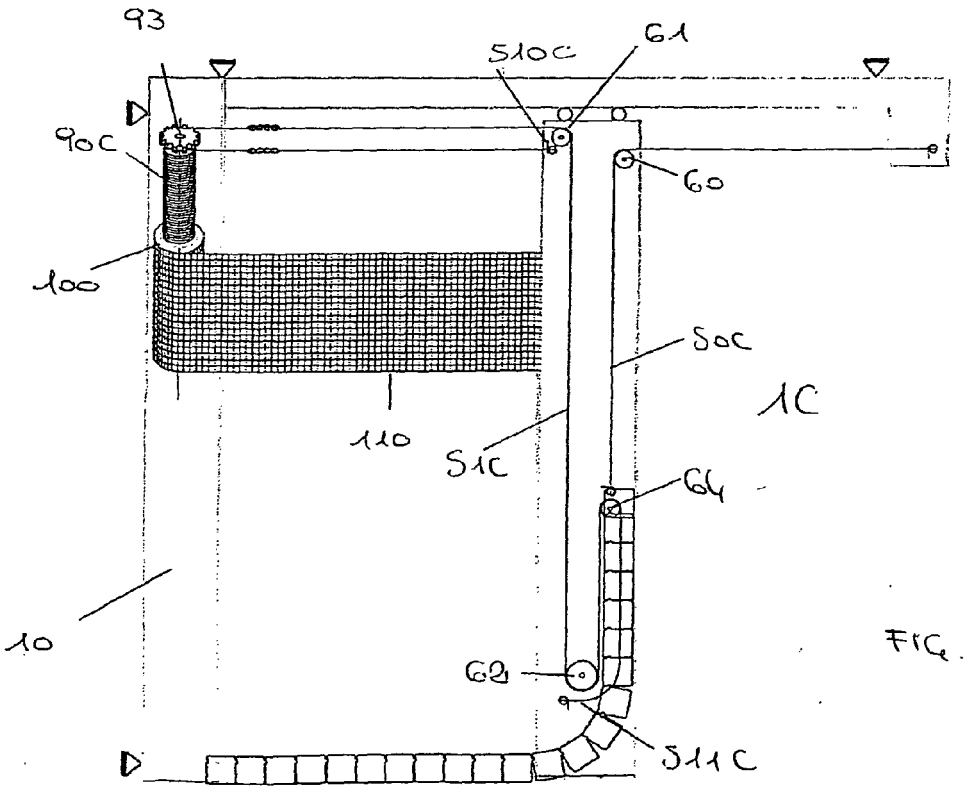
93
S10c
61
90c
60
100
S5c
1C
110
S1C
64
10
62
S11C

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 10 01 1704

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E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 February 2011	Schwertfeger, C

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22-02-2011

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