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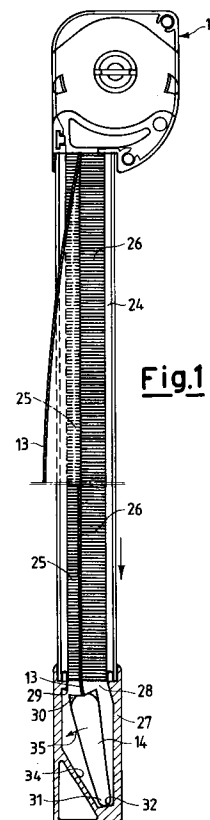
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**I-20121 Milano (IT)**(54) **Mosquito net with automatic screen tensioning device.**

(57) A mosquito net (13) with automatic net tensioning device comprising: a housing (11) containing a screen winding shaft with which an elastic element is associated in order to cause the rotation thereof to be stopped by friction; two vertical guides (24) provided with brush-like (25,26) elements, which vertical guides perform the task of allowing opposite longitudinal ends of the screen to slide; a handle bar (14) constrained to a free transversal end of the screen; a bottom transversal section bar (27) to connect both said vertical guides; and a drive element to drive said winding shaft rotation, in which the handle bar and the bottom section bar are provided with complementary automatic hooking elements (29,30) which interact with each other when an external stress is applied to the screen.

Also an adjustable-in-position stop element for said rotation drive element, consisting of a chain, is provided.

**Fig.1****EP 0 651 129 A1**

The present invention relates to a mosquito net with an automatic screen tensioning device.

In the mosquito nets known from the prior art, particularly complex devices are provided in order to cause the screen to remain locked in its unwound, lowered position in order to close the window space, or the like.

Besides having a rather complicated structure, which implies considerable manufacturing costs and high selling prices, also problems of correct assembly and positioning exist.

In fact, e.g., in some of these mosquito nets, the installer is obliged to perform an adjustment of mechanisms associated with the net winding shaft, with complex operations having to be carried out during the assembly step.

The purpose of the present invention is hence of providing a mosquito net which is provided with an automatically acting screen tensioning device capable of solving the assembly and construction complexity problems which affect the mosquito nets used heretofore.

This purpose according to the present invention is achieved by providing a mosquito net with automatic net tensioning device comprising: a housing containing a screen winding shaft with which an elastic element is associated in order to cause the rotation thereof to be stopped by friction; two vertical guides provided with brush-like elements, which vertical guides perform the task of allowing opposite longitudinal ends of the screen to slide; a handle bar constrained to a free transversal end of said screen; a bottom transversal section bar to connect both said vertical guides and a drive element to drive the rotation of said shaft, characterized in that said handle bar and said bottom section bar are provided with complementary automatic hooking elements which interact with each other when an external stress is applied to said screen.

The characteristics and advantages of a mosquito net according to the present invention will be better evident from the following exemplifying, non-limitative disclosure, referred to the accompanying schematic drawings in which:

Figure 1 shows a partially sectional side elevation view of a mosquito net provided with the automatic screen tensioning device according to the present invention, in which in a portion thereof the position of the screen nearby the side guide with the screen being during its downwards moving step; and in another portion the position of said screen in its central portion when the screen undergoes the wind action are displayed;

Figure 2 is an elevation view showing a detail similar to Figure 1, with the screen being commanded to move upwards;

Figure 3 shows the sectional view of an enlarged detail of the screen winding/unwinding drive element; and

Figure 4 shows a sectional view taken along the line IV-IV of Figure 3.

Referring to the figures, a mosquito net is shown which is equipped with an automatic screen tensioning device according to the present invention.

Inside a partially shown housing 11, on a winding shaft 12 a screen 13 winds which at its free bottom transversal end bears a handle bar 14 constrained to it.

Through an inner seat 15, the shaft 12 is constrained to a sleeve 16 having a key protrusion 17 which enters the seat 15. In its turn, the sleeve 16 is borne by a pin element 19 protruding from, and integral with, a head 18 of the housing.

On said pin element 19, a spring 20 is furthermore arranged which stops, by friction, the revolution of the shaft 12 and can be caused to get disengaged from the pin element on which it is arranged, by means of disengagement cam elements (not displayed) contained and provided inside a ring gear 21.

Inside the recesses of the ring gear, balls 22 get engaged of a chain 23 which drives the screen 13 to move upwards/downwards. In the example, said chain 23 is realized as a single-piece, ring-like element.

The heads 18 of the housing 11 enter vertical guides 24 containing two brush elements 25 and 26 with different-height bristles. Said brushes perform the task of keeping longitudinal ends of the screen 13 retained between them.

At the bottom end of the vertical guides 24, a transversal section bar 27 is installed, which connects said vertical guides 24. The section bar 27 has a contoured hollow which is capable of receiving, also by gravity, the handle bar 14 when the screen is fully lowered.

Under an upper opening 28 provided in the section bar 27, a transversal hooking tooth 29 is provided which interacts with an also transversal sharp-pointed central portion 30 provided on the handle bar 14.

The handle bar 14 and the bottom section bar 27 are thus provided with complementary automatic hooking devices mutually interacting when an external stress is applied to the screen.

The handle bar 14 has a rounded bottom end 31 suitable for coming to rest inside a narrow portion 32 provided at the bottom end of the section bar 27. This narrow portion 32 is arranged under the taller bristles 26. Furthermore, the difference in height of the bristles of the brushes 25 and 26 tends to guide the handle bar 14 in order that said handle bar 14 is caused to move towards

an inclined wall portion 34 of the section bar smoothly joining the narrow portion 32 of said section bar 27.

Still according to the invention, a stop element 33 is provided which is suitable for getting installed in spring-like fashion on the chain 23, e.g., on two adjacent balls 22. This stop element 33 performs the task of limiting the stroke of the chain 23 as a function of the height of the window space at which the mosquito net is installed.

A mosquito net according to the present invention provided with the automatic screen tensioning device operates as follows.

After having installed the structure of the mosquito net at, e.g., the window space, the installer acts on the chain 23 causing the screen 13, and, consequently, the handle bar 14 to move downwards, running between the brushes 25 and 26.

When the handle bar 14 has come at the upper opening 28 of the section bar 27, said handle bar 14 enters said section bar 27 and slides along the downwards inclined wall portion 34. The handle bar 14 is consequently forced to come to rest on the bottom end of the narrow portion 32, as shown in the bottom portion of Figure 1.

As the screen 13 continues to be unwound, said bottom, rounded end 31 of the handle bar causes said handle bar to pivot according to the direction of arrow 35 of Figure 1 -- with the handle bar 14 coming hence to rest against the side wall of the section bar 27. In that way, the sharp-pointed portion 30 comes to lay under the transversal hooking tooth 29 provided nearby the opening 28.

Furthermore, with the screen 23 being in that position, the stop element 33 is applied in order that the chain cannot be furthermore caused to move downwards, and the ring gear 21 cannot continue to revolve -- and unwind the screen.

Following the latter action, the mosquito net is correctly installed and prearranged to open and close the window space by lifting the screen, and moving it downwards.

When the screen is completely lowered and is stressed by wind penetrating towards the interior of the room equipped with said mosquito net, the screen tends to take that position, at least in a central portion thereof, as shown in the upper portion of Figure 1.

The screen 13 is retained at its upper side by the spring 20 which stops, by friction, the rotation of the shaft 12. At its bottom end, the screen tends to drag upwards the handle bar 14 resting against the internal wall of the section bar 27. Such a movement causes the sharp-pointed portion 30 of the handle bar and the hooking tooth 29 of the section bar to come into mutual engagement. This engagement prevents the screen from getting further bellied, keeping it under tension. Of course,

also the side brushes 25 and 26 help to keep the screen in its correct position, because the bristles penetrate the screen meshes, locking the screen.

When the screen of the mosquito net is lifted by acting on the chain 23, the handle bar 14 is lifted from its resting position rotated inside the section bar 27. In that way, any possible undesired engagements between the sharp-pointed portion 30 and the hooking tooth 29 are prevented, as illustrated in Figure 2.

Consequently and advantageously, a mosquito net with the automatic screen tensioning device provided according to the present invention, besides simplifying its assembly, keeps the screen under optimal tension conditions.

In fact, we were able to observe that the only necessary adjustment action to be undertaken by the installer is installing the stop element 33 in the suitable position on the drive chain 23.

## Claims

1. Mosquito net with automatic net tensioning device comprising: a housing containing a screen winding shaft with which an elastic element is associated in order to cause the rotation thereof to be stopped by friction; two vertical guides provided with brush-like elements, which vertical guides perform the task of allowing opposite longitudinal ends of the screen to slide; a handle bar constrained to a free transversal end of the screen; a bottom transversal section bar to connect both said vertical guides; and a drive element to drive the rotation of said shaft, characterized in that said handle bar and said bottom section bar are provided with complementary automatic hooking elements which interact with each other when an external stress is applied to said screen.
2. Mosquito net according to claim 1, characterized in that said hooking elements comprise a transversal hooking tooth provided on said bottom section bar and a sharp-pointed portion provided in the upper region of said handle bar, with said section bar displaying a contoured hollow suitable for receiving said handle bar and to cause said sharp-pointed portion to get positioned, by gravity, under said hooking tooth.
3. Mosquito net according to claim 1, characterized in that each of both said vertical guides contain a pair of brushes with bristles with different bristle heights.
4. Mosquito net according to claim 1, characterized in that said drive element which drives the

rotation of said winding shaft comprises a ring gear with which balls of a ball chain get engaged, with said ring gear bearing disengagement elements which cause said elastic element to get disengaged from said winding shaft. 5

5. Mosquito net according to claim 4, characterized in that a stop element is provided, which is suitable for being installed in spring-like fashion, on said chain, in order to limit the stroke thereof. 10
6. Mosquito net according to claim 4, characterized in that said chain is constituted by one single, closed-ring piece. 15

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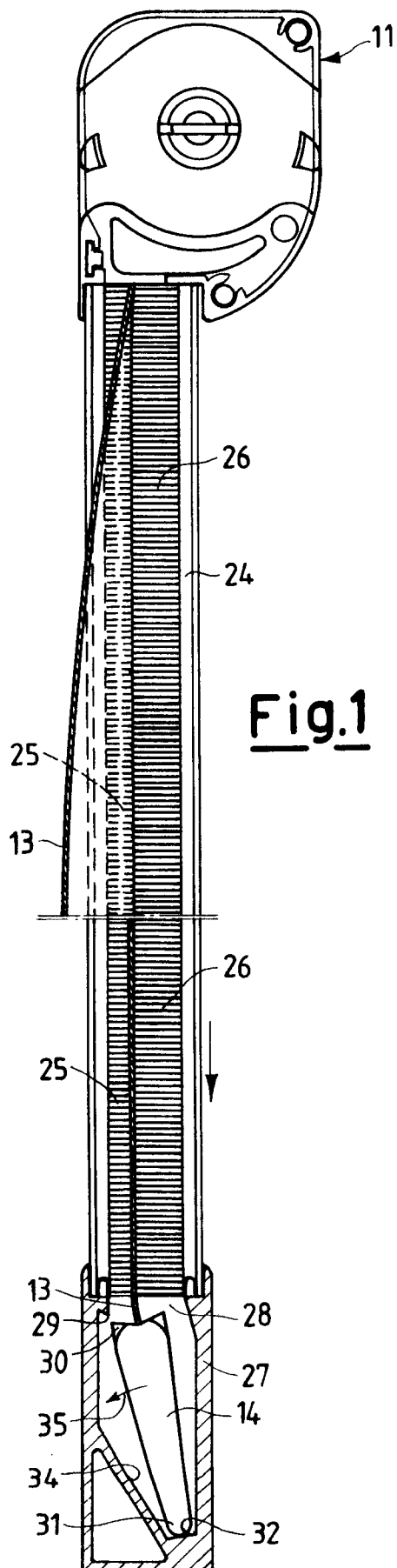
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**Fig.2**

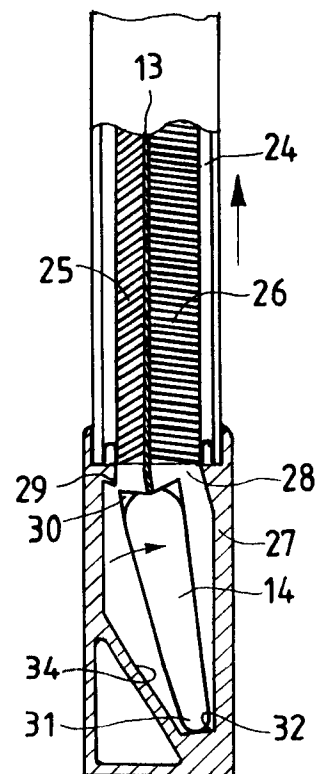


Fig.3

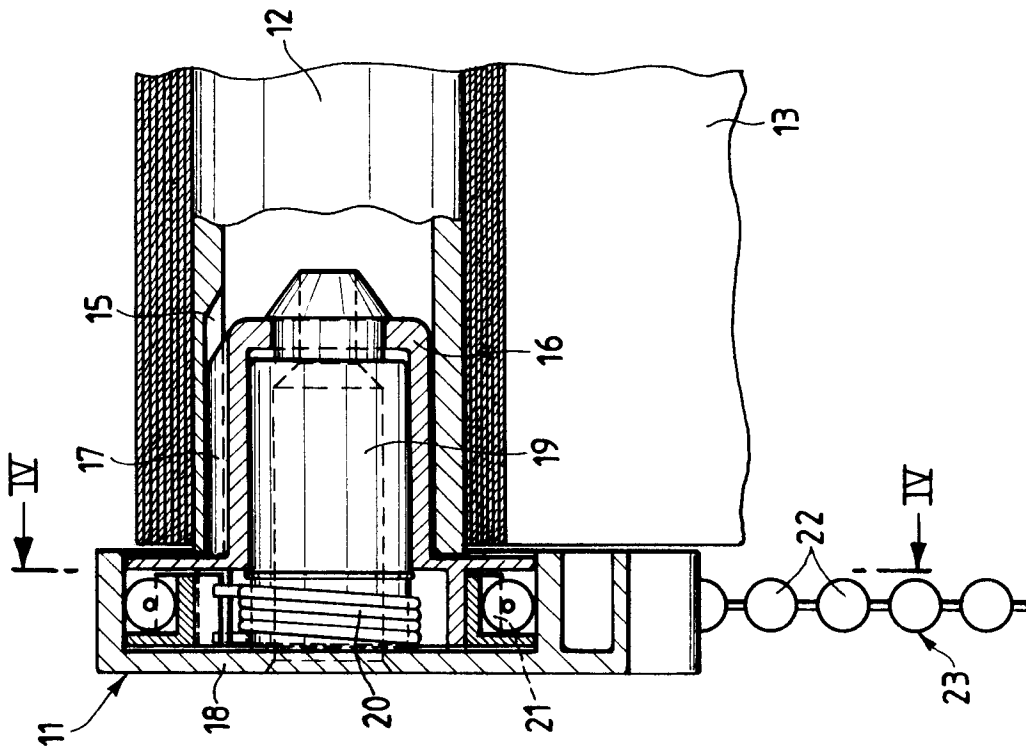
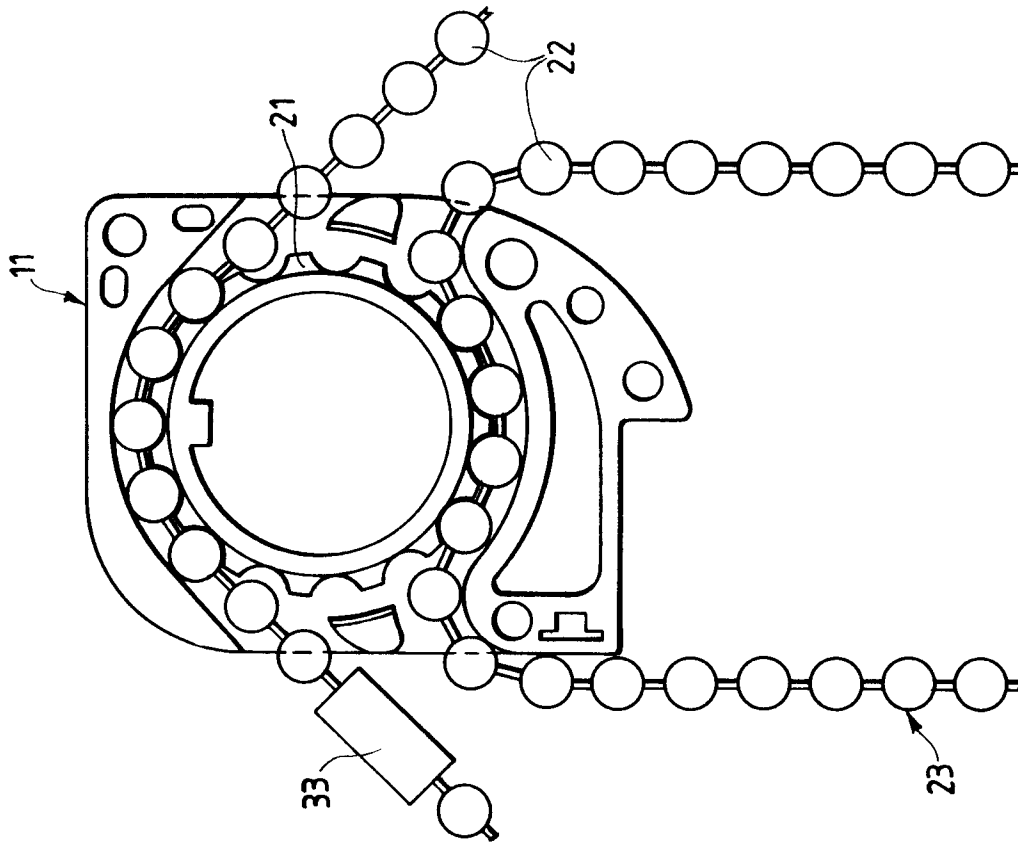


Fig.4





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## EUROPEAN SEARCH REPORT

Application Number  
EP 94 20 3092

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE-A-41 04 749 (PERFECTA-ROLLADEN GMBH) * column 6, line 13 - line 53 * * column 7, line 56 - column 9, line 48; figures * ---	1	E06B9/54
Y	US-A-4 662 423 (ISHII) * column 2, line 36 - column 4, line 3; figures 9-13 * ---	1	
A	FR-A-2 194 875 (BEAUTY BLINDS LTD) * page 4, line 21 - line 39; figure 3 * ---	1	
A	DE-A-34 05 799 (JOHANNES) * page 15, line 21 - page 16, line 3; figures * ---	1	
A	DE-U-91 00 549 (PLASTICA WALTHER GRÜN) * page 7, paragraph 3; figure 2 * ---	4-6	
P,A	EP-A-0 579 335 (HAMSTRA-WEESP B.V.) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E06B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 February 1995	Examiner Fordham, A
<b>CATEGORY OF CITED DOCUMENTS</b> 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			