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(54) Mechanical one-direction friction brake for smooth roll-up of roll fly-screen

(57) Braking mechanism for controlling and attenuating the roll-up speed of a roll fly-screen which has on the one end a spring for its automatic roll-up. The mechanism is mounted internally on the fly-screen axis (1) and is comprised by a nut (2) which rotates along with the axis (1) and is forced into an axial movement on the screw thread of the stable screw (3). The nut's movement causes the length variation of the spring (4) and the development of friction between the friction element (5) and the ratchet lock (6) as well as on the surface between the ratchet lock (6) and the friction element (7). During the extension of the fly-screen, the ratchet lock allows the free rotation of the fly-screen axis (1) creating braking only during its roll-up stage. The initial position of the nut (2) in relation to the spring determines both its initial prestress and the braking force that would be developed at the friction elements.

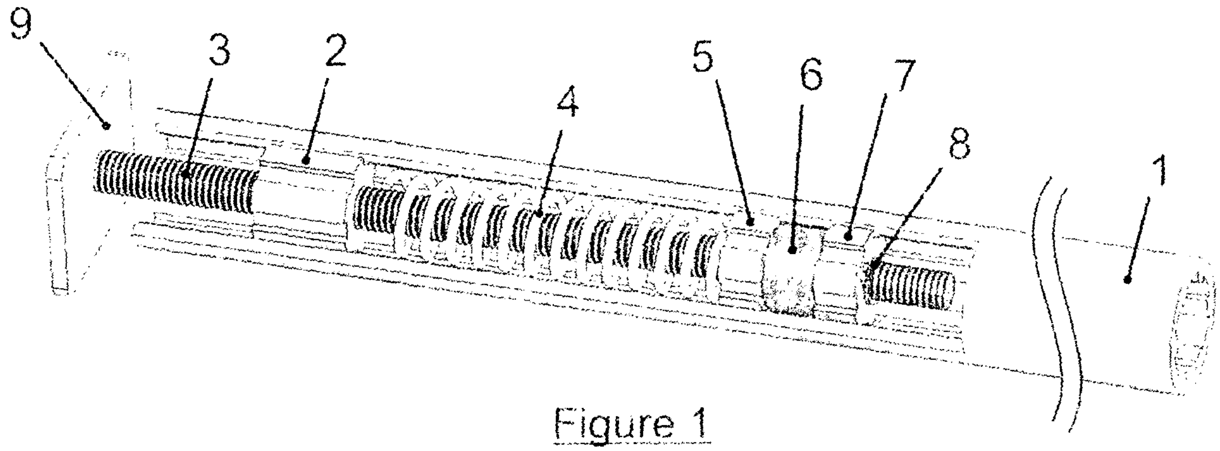

Figure 1

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Description

[0001] The present invention refers to a speed - controlling mechanism (braking) of rotary roll used in rotary fly-screen / mosquito mesh of both vertical and horizontal unwinding.

[0002] A classic structure of a rotary fly-screen comprises of a fly-screen (mesh), which, on one end, has got an ell that the user sets in motion. The ell is forced into motion within the vertical or horizontal guides respectively, resulting in the unwinding of the fly-screen. The other end of the fly-screen is stably mounted at an axis at which it unwinds or rolls up depending on the rotating direction. On the one end of the axis a rotary spring is mounted with initial pre-stress for the automatic roll-up of the fly-screen, while the other end rotates freely.

[0003] The operation of the fly-screen takes place in two stages. During the first stage, the user extends the fly-screen until the position of full extension and the force acted is accumulated in the rotary spring. At the position of full extension a device that locks the fly-screen acts upon, so as the fly-screen not to return by itself to the initial position of full roll-up due to the rotary spring. This rotation takes place only during the second stage, that is only if the user releases the locking device. The use of the rotary roll-up fly-screen is wide in modern houses.

[0004] The fly-screen structure, as presented above, does not comprise any brake mechanism. This lack of brake mechanism in relation to the need of initial pre-stress of the rotary spring, leads to high speeds during the roll-up of the fly-screen resulting to its unsafe operation. The risks present refer, on the one hand, to the user's physical integrity and, on the other hand, to the fly-screen itself due to its wear or damage, resulting from the collision of its various parts. That is the reason why several attempts have taken place towards the development of a brake mechanism with a different operation principle.

[0005] In the GR1004263 document a brake structure is presented that is based on the existence of a viscous liquid. This mechanism has a weakness; its operation is affected by environmental conditions. Thus, the roll-up speed of the fly-screen varies a great deal according to the environmental temperature, making the mechanism inconsistent.

[0006] Another brake category has as principle the centrifugal force as presented in the EP919854 document. The weakness of the brakes of this category is the increased production cost, due to their complexity and the increased volume of their structure. Due to the increased volume, the internal incorporation of the brake mechanism at the axis of the fly-screen is very difficult, while its external placement leads to the increase of the volume of the whole structure.

[0007] Generally, applying a brake mechanism into a fly-screen structure demands a smooth and safe operation throughout the whole route of roll-up, in relation to a low cost and reliability, regardless of environmental conditions. None of the above categories satisfies simultaneously all the above specifications. The present invention aims at creating a fly-screen brake mechanism, which would satisfy at the same time all the above specifications.

[0008] According to the invention, the smooth and proper operation of the fly-screen is succeeded by the use of an one-direction mechanical friction brake. The mechanism is comprised by friction elements for reducing the roll-up speed of the fly-screen and a ratchet lock mechanism, which allows the free one-direction rotation of the fly-screen.

[0009] A nut which follows the rotary movement of the fly-screen and co-operates with an axis that has a screw thread, is forced into an axial movement. The transportational movement of the nut results in the compression or the decompression of a spring, which by turn creates a variable vertical force at the friction elements. The initial placement of the nut in relation to the spring determines the initial pre-stress of the spring, on the one hand, and the maximum growing friction force, on the other hand.

[0010] A brake mechanism, with variable friction force, according to the above description has a lot of advantages.

[0011] Considering the axial movement of the nut and the existence of a spring, there grows an adjustably variable force at the friction elements resulting in the proper distribution of the force throughout the whole route of the fly-screen operation. Thus, the smooth operation of the structure is accomplished due to the controlled speed of roll-up, ensuring both the user's safety and the avoidance of collisions.

[0012] The use of a ratchet lock ensures the development of braking force only towards the direction of rotation (towards the roll-up of the fly-screen), while it allows the free rotation towards the opposite direction. Thus, the user is not aggravated with additional force during the extension of the fly-screen.

[0013] The solid components of the mechanism (lack of liquid parts) in relation to the small developing forces at the distinct friction elements ensure null wear of all mechanism's components, on the one hand, and unaffected operation regardless of environmental conditions, on the other hand. The combination of the two makes the mechanism reliable in the long run.

[0014] The mechanism's components are small and of simple geometry so as to compose a mechanism of small total volume that allows its internal incorporation into the axis of a fly-screen of any kind. Thus, the production cost of these components as well as their incorporation cost at the fly-screen structure is kept particularly low.

[0015] Further down, the description of the invention is presented along with an example and references to the attached drawings. The operation of the mechanism is characterised by two extreme positions, the upper and down one. In the upper extreme position the fly-screen is totally rolled at its axis, while in the down extreme position the fly-screen is in total extension.

[0016] In Figures 1 and 2, only the end of the fly-screen is depicted, at which the brake mechanism is mounted, while the other end is mounted to the roll-up spring. Figure 1 presents a three-dimensional perspective drawing of the brake mechanism mounted at the side face of the rotary fly-screen at the upper position. Respectively, Figure 2 presents the drawing of the mechanism at the down position. Finally, Figure 3 presents a three-dimensional perspective drawing of the development of the ratchet lock mechanism, as well as its elevation.

[0017] During the extension of the fly-screen, the fly-screen unrolls from its fly-screen axis (1) putting it at the same time into rotation. The fly-screen axis itself rotates the nut (2) which has the same external form with the side face of the fly-screen axis. The nut is mounted to an axis (3) with screw thread which remains stable (fastened) at the cover (9). Thus, due to its rotation the nut moves to the right, causing the coiling of the spring (4). This spring presses the friction element (5) on the ratchet lock mechanism (6) that presses by turn the friction element (7). The axial movement of the elements (5), (6) and (7) is prohibited due to a retaining ring (8). At the same time, the elements (5) and (7), due to their external form, follow the rotary movement of the fly-screen axis (1) and in relation to the force acted upon them by the spring (4) force the ratchet lock (6) to rotate towards the same direction. Towards that direction, though, the ratchet lock (6) rotates freely and, thus, the engaged elements (5), (6) and (7) perform a simultaneous rotary movement as one body, without developing friction forces in the intermediate surfaces. Thus, at the fly-screen no further resistance is developed and the existence of a brake mechanism does not influence the operation of the fly-screen during its extension.

[0018] Towards the opposite direction of rotation, during the roll-up of the fly-screen, the nut (2) following again the rotary movement of the fly-screen axis (1) moves to the left (Figure 2). Thus, the spring (4) starts gradually to decompress resulting in the decrease of the force acted upon elements (5), (6) and (7), from its maximum value developed at the position presented in Figure 2 up to its minimum value developed at the position presented in Figure 1. Towards this direction of rotation the ratchet lock (6) is motionless due to the fact that it is engaged with the stable axis (3). Thus the elements of friction (5) and (7), which, contrary to the ratchet lock (6), follow the rotary movement of the fly-screen axis (1), create a friction force at the intermediate surfaces of the elements (5)-(6) and (6)-(7). This friction force brakes the rotary speed of the elements (5) and (7) and, by extension, of the fly-screen axis (1). Therefore, the restraint of the fly-screen speed is accomplished during its roll-up. According to the initial placement of the nut in relation to the spring, the spring's pre-stress and, by extension, the developed friction at the elements of friction can be adjusted making the brake mechanism adjustable to different operation conditions.

[0019] Consequently, due to the kinetics of the brake mechanism during the roll-up of the fly-screen as described, maximum braking is accomplished at the down extreme position, which is gradually reduced, as the operation specifications of the fly-screen structure require.

Claims

1. Mechanical mechanism of roll fly-screen controlled movement, which is mounted internally at the rotary fly-screen axis (1) developing friction for the braking of the fly-screen and is **characterised by** a rotary nut (2) which rotates along with the fly-screen axis (1) and co-operates with the stable's axis screw thread (3) performing, thus, axial movement compressing or decompressing the spring (4). The specific spring by turn presses the rotating friction elements (5), (7) and the ratchet lock (6). The friction elements are placed from both sides of the ratchet lock (6) and they rotate always along with the axis (1). The compression of the spring creates a adjustably variable axial braking force at the lateral surfaces of the friction elements (5), (7) and of the ratchet lock (6) which come into contact. The braking force appears only towards the direction of the ratchet lock activation, resulting in the attenuation of the speed during the roll-up of the fly-screen.

2. Mechanical mechanism of roll fly-screen controlled movement, according to claim 1, which is **characterised by** a rotary nut (2) that rotates along with the fly-screen axis (1) and according to the direction of the axis (1) rotation it moves right or left on the axis (3), leading to compression or decompression of the spring (4) respectively. The initial position of the rotary nut (2) determines the application range of the braking force, while the axial movement rate of the nut (2) is determined by the form (pitch) of the axis screw thread (3).

3. Mechanical mechanism of roll fly-screen controlled movement, according to claim 1, that is **characterised by** distinct friction elements (5) and (7), mounted on the axis (3) which rotate along with the fly-screen axis (1) without being transferred axially and which have the appropriate dimensions and surface characteristics, so as to develop the demanded braking, without their wear, when the axial force of the spring (4) acts upon them. The friction force is caused between the surfaces of the elements (5)-(6), (6)-(7) as well as (7)-(8). Thus, through the many surfaces the desirable braking friction is accomplished constraining at the same time the risk of wear at which the elements are laid. The axial movement of the friction elements and of the ratchet lock is prohibited due to a retaining ring (8).

4. Mechanical mechanism of roll fly-screen controlled movement, according to claim 1, that is **characterised by** an axial spring (4) which on the one end is adjacent to the friction elements (5) and (7), while the other end to the rotating nut (2) which, on the one hand, determines its initial pre-stress and, on the other hand, creates the variation of its length, by compressing or decompressing it, causing increase or decrease of the axial force at the friction elements (5) and (7), accomplishing, thus, an adjustably variable axial force and, by extension, a friction force, making the mechanism adaptable to all the possible operation conditions.

5. Mechanical mechanism of roll fly-screen controlled movement, according to claim 1, that is **characterised by** a ratchet lock mechanism (6) which is mounted on the axis (3) and performs during extension free rotation drifted by the friction elements (5) and (7), a movement which is allowed due to the lack of engagement of the ratchet lock mechanism (6) with the axis (3), while, on the contrary, during roll-up, it becomes engaged with the stable axis (3) and stops, developing, thus, friction with the rotating friction elements (5) and (7), which are from both sides of the specific ratchet lock mechanism, creating the desirable constraint of the speed.

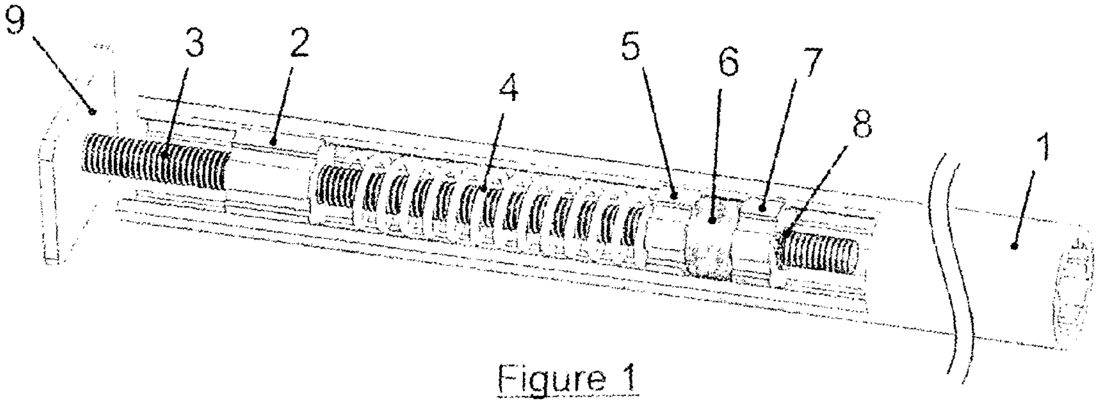

Figure 1

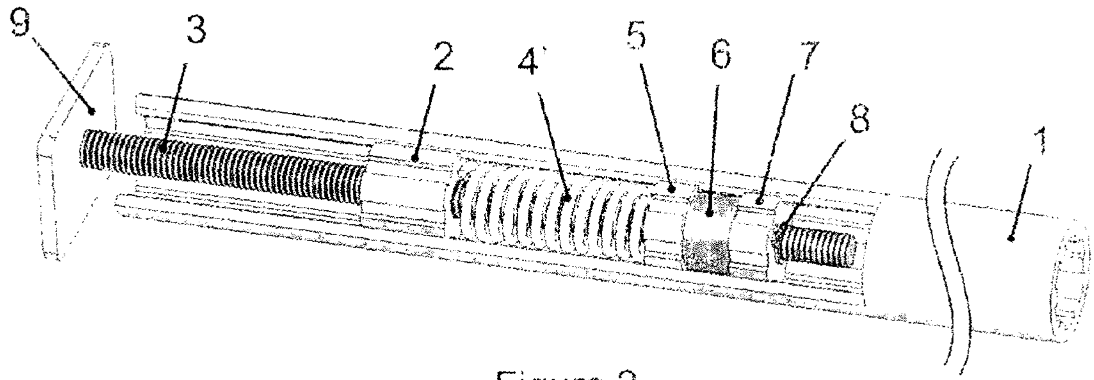

Figure 2

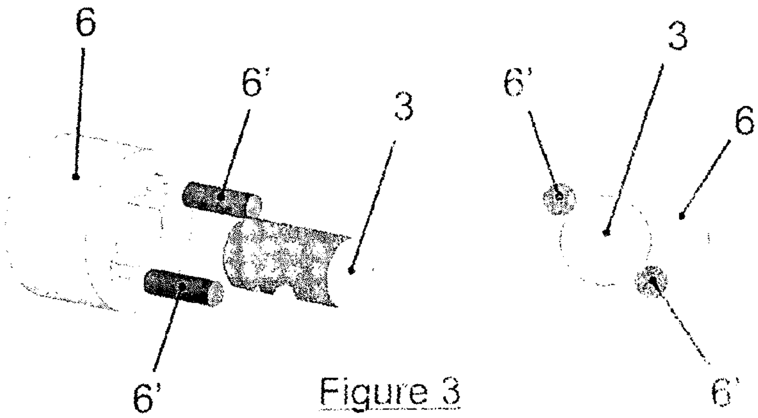

Figure 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GR 1004263 **[0005]**
- EP 919854 A **[0006]**