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(54) Venetian blinds roll-up device

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SPECIFICATION

1. TITLE OF THE INVENTION

Venetian blinds roll-up device

2. SCOPE OF PATENT CLAIMS

A venetian blinds roll-up device characterized in that a constant force spring is mounted on a drive shaft or operating shaft for performing the rolling up of venetian blinds, and the radius of curvature of the constant force spring is changed in response to the gradually increasing change in the load as the blinds are rolled up, so as to constantly generate a spring torque corresponding to the load of the blinds.

3. DETAILED DESCRIPTION OF THE INVENTION

When venetians blinds are rolled up by turning the operating shaft of the blinds by means of a gear mechanism or the like, the load increases gradually as the roll-up progresses, and conversely when the blinds are rolled down, the load becomes smaller as the roll-down progresses. Therefore, the force necessary to manipulate the operating shaft of the blinds is not constant and changes ceaselessly.

The present invention relates to a venetian blinds roll-up device characterized in that a constant force spring is mounted on the operating shaft of the venetian blinds, and the radius of curvature of the constant force spring is changed in response to the change in load as the blinds are rolled up, so as to constantly generate a spring

torque in the opposite direction and identical to the torque due to the load of the blinds acting upon the operating shaft, which has the effect that the force for manipulating the operating shaft in order to perform roll-up and roll-down of the blinds can be a: small, constant force regardless of the position of the blinds, and that the blinds do not fall spontaneously due to the weight of the blinds if roll-up is stopped mid-way, but are rather stopped at that position by the spring torque.

Regarding the illustrated embodiment example, an operating shaft 2 is mounted horizontally on the upper case 1 of the venetian blinds, tapes 4, 4 are wound onto drums 3, 3 attached to multiple locations on the operating shaft 2, and each tape 4 is passed through through-holes in the slats 5, 5 of the blinds and is coupled to lower case 6. A bevel gear 7 is attached to one end of operating shaft 2, a chain pulley 10 is fixed to drive shaft 9 of bevel gear 8 which engages with bevel gear 7, and an endless chain 11 is hung on chain pulley 10 and suspended downward.

Conventional venetian blinds are configured as described above, whereby one side of chain 11 is pulled to tum the chain pulley 10, the operating shaft 2 is turned through engagement and interlocking of the bevel gears 8 and 7, drums 3, 3 tum in one direction to pull up the lower case 6 for example by winding tapes 4 around the drums 3, and the slats 5, 5 are sequentially stacked on the lower case 6 and rolled up. Therefore, at the start of the roll-up, there is only the load of the lower case 6, but as the roll-up progresses, the load of the slats 5 is applied, so the torque to be applied in order to tum the operating shaft 2 is not constant and changes ceaselessly.

In the present invention, regardless of loads, for the purpose of performing the turning of the operating shaft 2 with a small constant force, as shown in FIG. 1 and FIG. 2, a constant force spring is mounted on the operating shaft 2, or as shown in FIG. 3 and FIG. 4, a constant force spring is mounted on drive shaft 9 which turns the operating shaft 2. In FIG. 2, support plate 12 is mounted inside the upper case 1, a shaft tube 13, which allows the operating shaft 2 to pass through and wedges it in place is secured to the support plate 12 (FIG. 6), and a constant force spring 17 is wound diagonally between drum 14 fixed to shaft tube 13 and drum 16 which is rotatably axially fitted onto center shaft 15 provided on support plate 12. Thus, in response to the torque of turning the operating shaft 2 based on the load P as the blinds are rolled up to the uppermost end, as shown in FIG. 9, the constant force spring 17 is made to produce a torque T in the opposite direction and identical to the torque due to the load P by making curvature radius R small at the starting end wound onto drum 14, as shown in FIG. 8, and as the blinds are rolled down, the load P decreases gradually, changing gradually to load p when the blinds are rolled down to the lowermost end, while the curvature radius of the constant force spring 17 is gradually increased from the curvature radius R of the starting end to the curvature radius r of the terminal end shown in FIG. 7, so that a spring torque t in the opposite direction and identical to the torque on the operating shaft 2 due to load p is generated at the terminal end.

When a constant force spring 17 of this sort is installed, it suffices to apply a small constant force in order to manipulate the endless chain 11 via bevel gears 7, 8 in order to tum the operating shaft 2, and if the manipulation of the endless chain 11 is stopped mid-way during roll-up or roll-down of the blinds, the torque of the blinds descending under their own weight will be balanced out by an identical spring torque in the opposite direction due to the constant force spring, so the blinds will stop at the mid-way position.

It will be noted that while it is ideal to change the radius of curvature of the constant force spring 17 in response to change in load of the blinds such that its torque changes gradually from torque T to torque t, as shown in FIG. 9, there is no practical impediment to employing a constant force spring machined such that the radius of curvature becomes a fixed (value) R so as to provide a spring torque P in a suitable range from the starting end, and whereof the radius of curvature becomes a fixed (value) r so as to provide a spring torque p at the terminal end, as shown by the dashed line in FIG. 9.

The effect of the constant force spring 17 in FIG. 3 and FIG. 4, where it is mounted on drive shaft 9, is the same as above, and the constant force spring 17 can simply be wound diagonally between drum 14 fixed to drive shaft 9 and drum 16, which is rotatably axially fitted onto center shaft 15.

4. BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of venetian blinds embodying the present invention; FIG. 2 is a vertical front cross-sectional view sectioned along line A-A of FIG. 1; FIG. 3 is a partial plan view of an embodiment example in which a constant force spring is mounted on the drive shaft of the venetian blinds; FIG. 4 is a partial front view vertically sectioned along line B-B of FIG. 3; FIG. 5 is a perspective view of a constant force spring; FIG. 6 is a vertical cross-sectional view along C-C of FIG. 5; FIG. 7 is a front view showing the state of the constant force spring at the position where the blinds have been fully lowered; FIG. 8 is a front view showing the state of the constant force spring at the position where the blinds have been fully raised and their load is the greatest; FIG. 9 is a graph showing the change in load of the blinds and the change in spring torque of the constant force spring.

1 ... upper case of blinds; 2 ⋯ operating shaft; 3 ... drum; 4 ... tape; 5 ... slat; 6 ... lower case; 7,8 ⋯ bevel gear; 9 ⋯ drive shaft; 10 ⋯ chain pulley; 11 ... endless chain; 12 ⋯ support plate; 13 ⋯ shaft tube; 14 ⋯ drum; 15 ⋯ center shaft; 16 ⋯ drum; 17 ... constant force spring.

FIG. 1

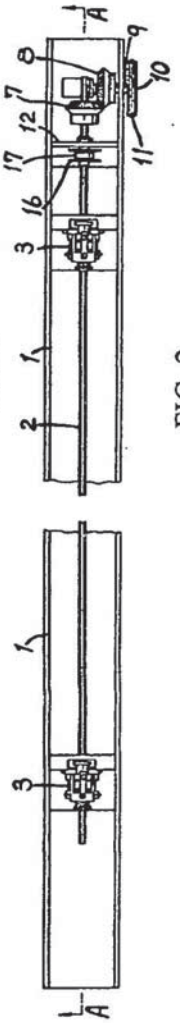


FIG. 2

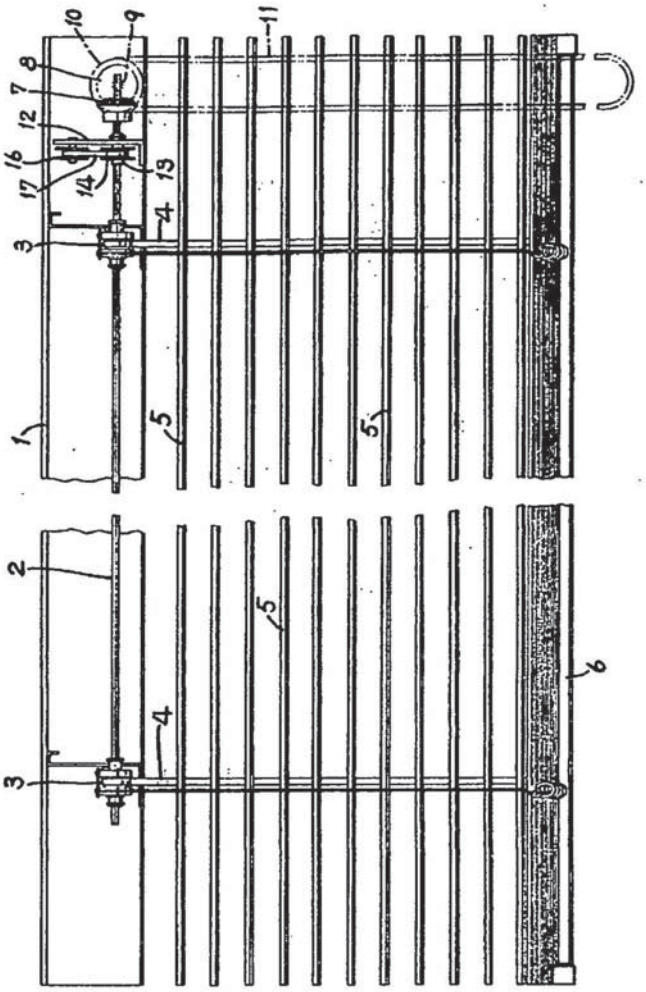


FIG. 3

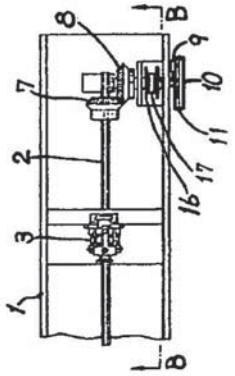


FIG. 4

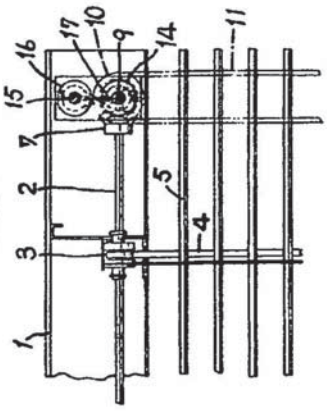


FIG. 8

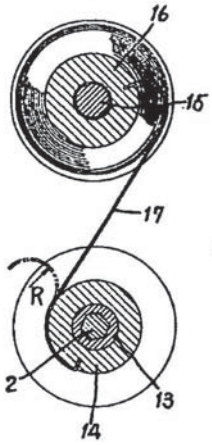


FIG. 7

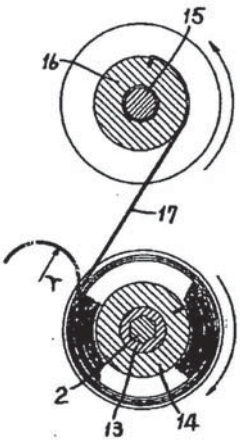


FIG. 6

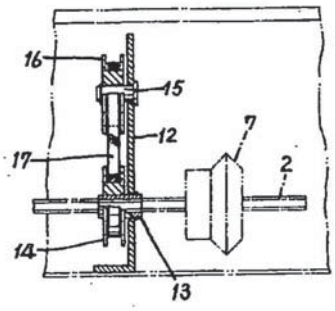


FIG. 5

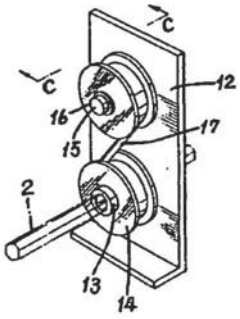
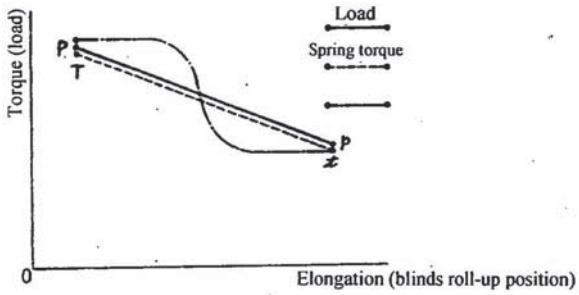


FIG. 9



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審査請求　有

（全 4 頁）

⑤4ベネシヤンブラインドの巻上装置

⑵1特　　願　昭52—105456
⑵2出　　願　昭52(1977)9月2日
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明　細　書

1. 発明の名称　ベネシヤンブラインドの巻上装置

2. 特許請求の範囲

ベネシヤンブラインドの巻上げを行う作動軸又は駆動軸に定荷重ばねを装着し、ブラインドを巻上げるに従い、次第に大きくなる荷重の変化に対応して定荷重ばねの曲率半径を変化して常にブラインドの荷重に相当するばねトルクを生ずるようにしてなることを特徴とするベネシヤンブラインドの巻上装置。

3. 発明の詳細な説明

ベネシヤンブラインドの作動軸を歯車機構等をもつて回転してブラインドを巻上げるとき、巻上げの進行と共に次第に荷重が大きくなり、逆に巻下げるとき巻下げの進行と共に荷重が小さくなる。従つてブラインドの作動軸を操作するのに要する力は一定でなく絶えず変化している。

本発明はベネシヤンブラインドの作動軸に定荷重ばねを装着し、ブラインドを巻上げるときの荷重の変化に対応して定荷重ばねの曲率半径を変化して作動軸に作用するブラインドの荷重によるトルクと同一にして逆方向のばねトルクを生ずるようにしてなることを特徴とするベネシヤンブラインドの巻上装置に関するものであつて、ブラインドの巻上げ巻下しを行うために作動軸を操作する力はブラインドの位置に関係なく一定の軽少の力でよく、さらにブラインドの巻上げを途中で中止してもブラインドの重量で自然落下せず、ばねトルクをもつてその位置に停止させることができる効果がある。

図面の実施例について、ベネシヤンブラインドの上函1に作動軸2を横架し、作動軸2の数個所に取着けたドラム3，3にテープ4，4を巻回し、各テープ4はブラインドのスラット5，5…の透孔を貫通して下函6に連結する。作動軸2は一端に傘歯車7を取着け、傘歯車7に噛合する傘歯車8の駆動軸9にチエーン車10を固着し、チエーン車10に無端チエーン11を懸架して下方に垂下する。

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