CORD-SECURING DEVICE FOR WINDOW SHADE

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ABSTRACT

A cord-securing device for a window includes including first and second clamping units each having an extension portion and a clamp on opposite ends of an interconnecting portion. The extension portion of the first clamping unit extends through an opening in the interconnecting portion of the first clamp and is engaged with the extension portion of the first clamping unit. A holding unit includes a resilient member having arms. The extension portions of the first and second clamping units are engaged between the arms. A switch arm includes an engaging seat to which a cord is attached. An axle is fixed to a pivotal portion extending from the engaging seat. The axle is rotatably positioned between the extension portions. The switch arm is pivotable to control two positioning end faces of the axle to abut or not abut the extension portions to control clamping or not clamping of the clamps.
FIG. 1
PRIOR ART
FIG. 2
PRIOR ART
CORD-SECURING DEVICE FOR WINDOW SHADE

BACKGROUND OF THE INVENTION

[0001] Field of the Invention

[0002] The present invention relates to a cord-securing device for a window shade and, more particularly, to a cord-securing device that can automatically be detached from the bottom rail of a window shade when the cord-securing device is subjected to external angle-changing force other than the original direction force from the cord.

[0003] Description of the Related Art

[0004] Window shades are mounted to windows for shielding the sun light and enhancing privacy as well as for decoration purposes. A wide variety of window shades has been developed, including Venetian blinds, honeycomb shades, Roman shades, roller type shades, vertical blinds, etc.

[0005] FIGS. 1 and 2 show a conventional Roman shade 9 including a shade 91, an upper rail 92, a lower rail 93, a cord guide device 94, and a plurality of securing devices 95. The shade 91 includes a plurality of sections 912 separated by a plurality of horizontal folds 911. The top end of the shade 91 is mounted to upper rail 92, and the lower rail 93 is mounted to a lower end of the shade 91. The cord guide device 94 includes a plurality of pulley sets and is received in the upper rail 92. The cord guide device 94 further includes a plurality of cords 941 connected to the securing devices 95. The cords 941 can be wound or released by the cord guide device 94 to fold or unfold the shade 91.

[0006] Each securing device 95 includes a positioning seat 951 screwed to a horizontal fold 911 of the shade 91 adjacent to the lower rail 93. A tube 952 is extended from a side of the positioning seat 951. A cord hole 953 is extended through the positioning seat 951 and the tube 952. A cord 941 is extended through the cord hole 953 and then forms a stop 9411 at the other side of the positioning seat 951. The stop 9411 has a size larger than a diameter of the cord hole 953 to prevent the cord 941 from disengaging from the cord hole 953. A user can hold the lower rail 93 and apply an upward or downward force to the shade 91 to control folding/unfolding operation of the cord guide device 94 for the purposes of folding or unfolding the shade 91.

[0007] However, a child or pet could be strangled by the cord 941 exposed to a side of the shade 91 of the Roman shade 9. Since the securing devices 95 and the shade 91 are fixed together by screwing or bonding, it is difficult to rapidly detach the securing devices 95 from the shade 91 in an emergency. Furthermore, the cord 941 may further strangle the child or pet when subjected to the force trying to remove the cord 941.

[0008] Thus, a need exists for a cord-securing device that allows easy detachment of the cord from the shade in an emergency.

SUMMARY OF THE INVENTION

[0009] An objective of the present invention is to provide a cord-securing device that can automatically be detached from the shade to provide increased safety when the cord-securing device is subjected to external angle-changing force other than the original direction force from the cord.

[0010] Another objective of the present invention is to provide a cord-securing device that is mounted by a connection seat to a side of the shade or to a lower rail fixed to the side of the shade, wherein the cord-securing device, when subjected to external angle-changing force other than the original direction force from the cord, can change its angular position in response to the external force, such that the cord-securing device can be rapidly detached from the shade in an emergency.

[0011] The present invention fulfills the above objectives by providing, in a preferred form, a cord-securing device including a first clamping unit, a second clamping unit, a holding unit, and a switch arm. The first clamping unit includes a first extension portion, a first interconnecting portion, and a first clamp. The first extension portion and the first clamp are respectively connected to two opposite ends of the first interconnecting portion. The first interconnecting portion includes an opening. The second clamping unit includes a second extension portion, a second interconnecting portion, and a second clamp. The second extension portion and the second clamp are respectively connected to two opposite ends of the second extension portions of the second interconnecting portion. The second extension portion extends through the opening and is engaged with an end of the first extension portion. The holding unit includes a resilient member having two mutually facing arms. The first and second extension portions are engaged between the arms of the resilient member. The switch arm includes an engaging seat and an axle. A cord of a window shade is adapted to be attached to the engaging seat. A pivotal portion extends from the engaging seat. The axle is fixed to the pivotal portion. The axle is rotatably positioned between the first and second extension portions. The axle includes first and second positioning end faces. The switch arm is pivotable to control the first and second positioning end faces of the axle to abut or not abut the first and second extension portions to control clamping or not clamping of the first and second clamps.

[0012] In preferred forms, a connection seat is mounted to a side of a shade of the window shade. The axle includes non-circular cross sections perpendicular to a longitudinal axis of the axle. The axle has a major diameter and a minor diameter. The major diameter is perpendicular to a longitudinal axis of the axle and an extending direction of the cord. The minor diameter is perpendicular to the major diameter and the longitudinal axis of the axle. The axle further includes first and second positioning end faces on two end faces of the major diameter. When the switch arm is in a locking position, the first and second positioning end faces abut the first and second extension portions to make the first and second clamps clamp the connection seat. The end of the cord is, thus, fixed to a side of the shade or to a lower rail on a side of the shade. When the switch arm is rotated about the axle to an unlocking position, the clamping state of the first and second clamps and the connection seat is released, such that the end of the cord becomes a free end to avoid strangling of a playful child, providing increased safety.

[0013] The present invention will become clearer in light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The illustrative embodiments may best be described by reference to the accompanying drawings where:

[0015] FIG. 1 shows a perspective view of a window shade including a conventional cord-securing device.

[0016] FIG. 2 shows an enlarged view of a portion of the window and the cord-securing device of FIG. 1.
FIG. 3 shows a perspective view of a window shade including a cord-securing device according to the preferred teachings of the present invention.

FIG. 4 shows an exploded, perspective view of the cord-securing device and a portion of the window shade of FIG. 3.

FIG. 5 shows a perspective view of the cord-securing device and the portion of window shade of FIG. 3.

FIG. 6 shows a cross sectional view of the cord-securing device and the portion of the window shade of FIG. 3 according to section line 6-6 of FIG. 5 with a switch arm in a locking position and with first and second clamps engaged with each other.

FIG. 7 shows an enlarged view of a portion of the cord-securing device of FIG. 6.

FIG. 8 shows a cross sectional view of the cord-securing device and the portion of the window shade of FIG. 3 with the switch arm in an unlocking position and with the first and second clamps disengaged from each other.

FIG. 9 shows an exploded, perspective view of a portion of a window shade and a cord-securing device of a second embodiment according to the preferred teachings of the present invention.

FIG. 10 shows a perspective view of the cord-securing device and the portion of the window shade of FIG. 9.

FIG. 11 shows an exploded, perspective view of a portion of a window shade and a cord-securing device of a third embodiment according to the preferred teachings of the present invention.

FIG. 12 shows a side view of the cord-securing device and the portion of the window shade of FIG. 11.

FIG. 13 shows an enlarged view of the cord-securing device and the portion of the window shade of FIG. 11.

FIG. 14 shows a cross sectional view of the cord-securing device and the portion of the window shade of FIG. 13 according to section line 14-14 of FIG. 13.

FIG. 15 shows an enlarged view of the cord-securing device and the portion of the window shade of FIG. 11 with a switch arm moved to an unlocking position.

FIG. 16 shows an exploded, perspective view of a portion of a window shade and a cord-securing device of a fourth embodiment according to the preferred teachings of the present invention.

FIG. 17 shows a perspective view of the portion of the window shade and the cord-securing device of FIG. 16.

All figures are drawn for ease of explanation of the basic teachings of the present invention only; the extensions of the figures with respect to number, position, relationship, and dimensions of the parts to form the preferred embodiments will be explained or will be within the skill of the art after the following teachings of the present invention have been read and understood. Further, the exact dimensions and dimensional proportions to conform to specific force, weight, strength, and similar requirements will likewise be within the skill of the art after the following teachings of the present invention have been read and understood.

Where used in the various figures of the drawings, the same numerals designate the same or similar parts. Furthermore, when the terms “first”, “second”, “lower”, “upper”, “inner”, “outer”, “side”, “end”, “portion”, “section”, “longitudinal”, “axial”, “radial”, “horizontal”, “lateral”, “annular”, “spacing”, and similar terms are used herein, it should be understood that these terms have reference only to the structure shown in the drawings as it would appear to a person viewing the drawings and are utilized only to facilitate describing the invention.

**DETAILED DESCRIPTION OF THE INVENTION**

A cord-securing device according to the preferred teachings of the present invention is adapted to removably mount a cord to a shade of a window shade in the preferred forms shown as a Roman shade 8 in the drawings. However, the cord-securing device according to the preferred teachings of the present invention can be utilized on window shades other than Roman shades.

With reference to FIG. 3, the window shade 8 includes a shade 81, an upper rail 82, a cord guide device 83, and a lower rail 84. The shade 81 includes a plurality of horizontal folds 811. A top end of the shade 81 is mounted to the upper rail 82. The cord guide device 83 is received in the upper rail 82 and includes a plurality of cords 831 connected to the shade 81. The lower rail 84 can be directly provided on a side of the shade 81 or embedded in one of the horizontal holds 811.

With reference to FIGS. 3 and 4, a cord-securing device of a first embodiment according to the preferred teachings of the present invention includes an end to which one of the cords 831 is fixed. The other end of the cord-securing device is engaged with the shade 81. Specifically, the cord-securing device of the first embodiment according to the preferred teachings of the present invention includes a first clamping unit 1, a second clamping unit 2, a holding unit 3, and a switch arm 4. Each of the first and second clamping units 1 and 2 is substantially N-shaped in cross section. An end of the second clamping unit 2 is connected to the first clamping unit 1 by the holding unit 3. An end of the switch arm 4 is pivotally received between the first and second clamping units 1 and 2. The other end of the switch arm 4 is connected to the cord 831.

The cord-securing device of the first embodiment according to the preferred teachings of the present invention includes further includes a connection seat 5 mounted to a side of the shade 81 or to the lower rail 84 fixed on a side of the shade 81. The first and second clamping units 1 and 2 can be engaged and positioned through the connection seat 5, such that an end of the cord 831 can be fixed to the side of the shade 81.

The first clamping unit 1 includes a first extension portion 11, a first interconnecting portion 12 with an opening 14, and a first clamp 13. The first extension portion 11 and the first clamp 13 are respectively extended from two opposite ends of the first interconnecting portion 12 and extended away from each other in opposite directions. In this embodiment, a side of the first extension portion 11 forms a first assembling face 111 in the form of an arcuate face. An auxiliary positioning face 112 in the form of a planar face is formed at a bottom of the arcuate face. A projection 113 is formed on an intermediate portion of the auxiliary positioning face 112. The first extension portion 11 further includes a first engaging end 114 having opposite first and second faces. The first face of the first extension portion 11 includes a plurality of engaging sections 1142. A ridge 1141 is formed on the second face of the first extension portion 11.

The first interconnecting portion 12 includes first and second abutment faces 121 on opposite sides of the opening 14. The first and second abutment faces 121 are planar in this embodiment. The first clamp 13 includes a clamping face
131 facing the second clamping unit 2 and a first coupling portion 132. In this embodiment, the first coupling portion 132 is in the form of a notch in the clamping face 131. The opening 14 at least is extended through the first interconnecting portion 12 to allow passage of an end of the second clamping unit 2.

[0040] The second clamping unit 2 includes a second extension portion 21, a second interconnecting portion 22, and a second clamp 23. The second extension portion 21 and the second clamp 23 are respectively extended from two opposite ends of the second interconnecting portion 22 and extended away from each other in two opposite directions. In this embodiment, a side of the second extension portion 21 forms a second assembling face 211 in the form of an arcuate face. An auxiliary positioning face 212 and a stop 213 are formed on the second assembling face 211 and are substantially the same as the auxiliary positioning face 112 and the stop 113. The second extension portion 21 further includes a second engaging end 214 having opposite first and second faces. The first face of the second extension portion 21 includes a plurality of engaging sections 2142. A ridge 2141 is formed on the second face of the second extension portion 21. The engaging sections 1142 and the 2142 are correspondingly formed positioning structures. In this embodiment, the engaging sections 1142 are in the form of receptacles, and the engaging sections 2142 are in the form of pegs. However, other forms with mutually engageable structures can be utilized according to the teachings of the present invention.

[0044] In this embodiment, the connection seat 5 includes a base 51 and two wings 52. The base 51 has substantially U-shaped cross sections, and a space is formed between the base 51 and the wings 52. However, the cross sections of the base 51 can be of other shapes such as L-shaped or crescent shapes. The wings 52 are formed on opposite sides of the base 51 and fixed to the lower rail 84 on a side of the shade 81. The base 51 includes a coupling slot 511 through which the first and second coupling portions 132 and 232 are engaged.

[0045] With reference to FIGS. 4 and 5, in assembly, the second extension portion 21 of the second clamping unit 2 is firstly extended through the opening 14, and the axle 43 of the switch arm 4 is sandwiched between the first and second assembling faces 111 and 211. Furthermore, the engaging section 2142 of the second engaging end 214 is positioned at the engaging section 1142 of the first engaging end 114. In this case, the second assembling face 211 faces the first assembling face 111, and the clamping face 231 of the second clamp 23 faces the clamping face 131 of the first clamp 13. Further, the stops 113 and 213 of the first and second extension portions 11 and 21 are received in the limiting groove 432 of the axle 43.

[0046] The first engaging end 114 is engaged with the second engaging end 214. The engaging section 2142 of the second engaging end 214 is inserted into the engaging section 1142 of the first engaging end 114. Next, the first and second engaging ends 114 and 214 are inserted between the arms 311 and 312 of the resilient member 31. Thus, the first and second engaging ends 114 and 214 are positioned on the arms 311 and 312 with the ridges 1141 and 2141 inserted in the insertion grooves 34. After assembly of the first and second clamping units 1 and 2, the first and second clamping units 1 and 2 can pivot about a connection between the first and second engaging ends 114 and 214. The major diameter a of the axle 43 abuts against the first and second extension portions 11 and 12 to make the first and second clamping units 1 and 2 move relative to each other, urging the first and second clamps 13 and 23 (not shown) to return to their intially engaged position.
and 23 to clamp or release. The switch arm 4 is pivotably engaged with the first and second clamping units 1 and 2 via the axle 43.

[0047] With reference to FIGS. 5-7, when connecting the cord 831 to the lower rail 84 on a side of the shade 81 utilizing the cord-securing device according to the preferred teachings of the present invention, the cord 831 can be fixed in the through-hole 411 of the engaging seat 41 in a manner of a knot, and the wings 52 of the connection seat 5 are fixed by screwing or bonding to the lower rail 84 on the side of the shade 81.

[0048] Next, the first clamp 13 is extended through the space between the base 51 of the connection seat 5 and the lower rail 84 (or the shade 81). A user can swing the switch arm 4 rely on external angle-changing force on cord to control the first and second clamps 13 and 23 to or not to engage at the base 51 of the connection seat 5. If it is desired to fix the base 51 between the first and second clamps 13 and 23, the switch arm 4 is swung to a locking position where the first and second positioning end faces 431 respectively abutting against the auxiliary positioning faces 112 and 212. At the same time, the pressing end faces 421 of the pivotal arms 42a and 42b reliably abut the first and second abutment faces 121 of the first interconnecting portion 12. Thus, the switch arm 4 will not unintentionally pivot away from the locking position.

[0049] Since the first and second engaging ends 114 and 214 engage with each other and act as a swaying fulcrum for the first and second clamping units 1 and 2, the major diameter a of the axle 43 can abut the auxiliary positioning faces 112 and 212 to minimize the spacing between the first and second clamps 13 and 23 while maintaining the maximum spacing between the first and second extension portions 11 and 21. Thus, the second coupling portion 232 can be extended through the coupling slot 511 to engage with the first coupling portion 132. An end of the cord 831 is, thus, securely fixed to the side of the shade 81 or to the lower rail 84 on the side of the shade 81.

[0050] On the other hand, when it is desired to release the engagement between the first and second clamps 13 and 23, the user can only swing the switch arm 4 to an unlocking position such that the first and second positioning end faces 431 are disengaged from the auxiliary positioning faces 112 and 212. At the same time, the pressing end faces 421 of the pivotal arms 42a and 42b are disengaged from the first and second abutment faces 121.

[0051] Since the major diameter a is the maximum diameter of the axle 43, when the first and second extension portions 11 and 21 lose support from the first and second positioning end faces 431, the spacing between the first and second extension portions 11 and 21 is shortened due to the returning of the resilient member 31. In this moment, the relative movement between the first and second clamping units 1 and 2 results in an increment of the spacing between the first and second clamps 13 and 23. As a result, the engagement between the first and second clamps 13 and 23 at the base 51 can not be maintained.

[0052] By controlling the engagement of the first and second clamping units 1 and 2 at the connection seat 5 through pivoting the switch arm 4 according to the teachings of the present invention, the original direction tension force imparted from the cord 831 to the axle 43 can not pivot the switch arm 4 without external angle-changing force imparted to the switch arm 4. Thus, undesired disengagement of the first and second clamping units 1 and 2 at the connection seat 5 is avoided, and the cord 831 is reliably connected to the lower rail 84 on the side of the shade 81.

[0053] In a case that the cord 831 is pulled by a child that is playing, the switch arm 4 is liable to swing to the unlocking position by the external pulling force. The engagement between the first and second clamping units 1 and 2 at the connection seat 5 is released. The end of the cord 831 becomes free, avoiding strangling of the child by the cord 831. The safety is, thus, increased.

[0054] With reference to FIGS. 9 and 10, a cord-securing device of a second embodiment according to the preferred teachings of the present invention includes first and second clamping units 1 and 2, a holding unit 3, a switch arm 4, and a connection seat 6. The first and second clamping units 1 and 2, the holding unit 3, and the switch arm 4 of this embodiment are substantially identical to those of the first embodiment and therefore not described in detail to avoid redundancy.

[0055] Compared to the first embodiment, the connection seat 6 of the second embodiment includes a base 61 and a platform 62. The base 61 includes two wings 611 and a first pivotal portion 612. The wings 611 are located on opposite sides of the base 61 and fixed to a side of the shade 81 or to the lower rail 84 on a side of the shade 81. In this embodiment, the first pivotal portion 612 includes a pivot hole defining a pivot axis parallel to the extending direction of the cord 831. The platform 62 includes a second pivotal portion 621 and a coupling slot 622. The second pivotal portion 621 is in the form of a pivot received in the pivot hole. Thus, the second pivotal portion 621 of the platform 62 is rotatably engaged with the first pivotal portion 612 of the base 61. After engagement of the first and second pivotal portions 612 and 621, the coupling slot 622 is perpendicular to the pivot axis of the first pivotal portion 612, so that the first and second clamps 13 and 23 can be engaged in the coupling slot 622.

[0056] In assembly of the second embodiment shown in FIGS. 9 and 10, the wings 611 of the connection seat 6 is fixed by screwing or bonding to the lower track 84 on the side of the shade 81 to provide a place for the first and second clamping units 1 and 2 to clamp. By providing the first and second pivotal portions 612 and 621, the platform 62 can rotate relative to the base 61, such that when the switch arm 4 is subjected to external angle-changing force other than the original direction force from the cord 831, the orientation of the external force imparted to the platform 62 can be changed, ensuring that the external force can rotate the axle 43 to automatically release the engagement between the first and second clamps 13 and 23 at the connection seat 6, avoiding strangling of a playful child by the cord 831 and, thus, increasing safety.

[0057] With reference to FIGS. 13-15, a cord-securing device of a third embodiment according to the preferred teachings of the present invention includes first and second clamping units 1 and 2, a holding unit 3, a switch arm 4, and a connection seat 6. The first and second clamping units 1 and 2, the holding unit 3, and the switch arm 4 of this embodiment are substantially identical to those of the second embodiment and therefore not described in detail to avoid redundancy.

[0058] Compared to the second embodiment, the first pivotal portion 612 of the connection seat 6 of the third embodiment includes in the form of a pivot hole defining a pivot axis perpendicular to the extending direction of the cord 831. Furthermore, the base 61 includes a plurality of disengagement preventing portions 613 extending radially from an inner periphery of the first pivotal portion 612. The second
pivotal portion 621' of the platform 62' is in the form of a pivot rotatably received in the first pivotal portion 612' of the base 61'. Furthermore, the platform 62' includes a plurality of lugs 623' extending radially from an outer periphery of the second pivotal portion 621'. Preferably, the number of the lugs 623' is the same as the disengagement preventing portions 613'.

[0059] With reference to FIGS. 12-14, when mounting the platform 62' to the base 61', the lugs 623' are misaligned with the disengagement preventing portions 613' to allow insertion of the second pivotal portion 621' into the first pivotal portion 612'. Next, the platform 62' is rotated until the lugs 623' abut the second pivotal portion 621' to prevent undesired disengagement of the second pivotal portion 621' from the first pivotal portion 612'. After engagement between the second pivotal portion 621' and the first pivotal portion 612', the coupling slot 622' of the platform 62' is perpendicular to the pivot axis of the first pivotal portion 612', so that the first and second clamps 13 and 23 can be engaged in the coupling slot 622'.

[0060] By providing the platform 62' capable of rotating relative to the base 61', when the switch arm 4 is subjected to external angle-changing force other than the original direction force from the cord 831, the orientation of the external force imparted to the platform 62' can be changed, assuring that the external force can rotate the axle 43 relative to the first and second clamping units 1 and 2 to automatically release the engagement between the first and second clamps 13 and 23 at the connection seat 6'. Furthermore, when the platform 62' rotates relative to the base 61' under the action of the external force, the lugs 623' are disengaged from and misalign with the disengagement preventing portions 613' (FIG. 15), such that the platform 62' can be disengaged from the base 61'. Thus, the cord-securing device of the third embodiment according to the teachings of the present invention provides double safety measures to avoid strangling of a playful child by the cord 831 and, thus, significantly increases safety.

[0061] The pivot axis of the platform 62' of the second embodiment is parallel to the extending direction of the cord 831, such that the platform 62' can provide the switch arm 4 with axial rotation relative to the cord 831 (FIG. 10). The pivot axis of the platform 62' of the third embodiment is perpendicular to the extending direction of the cord 831, such that the platform 62' allows the switch arm 4 to sway laterally relative to the cord 831 (FIG. 12). Although different embodiments are shown in the second and third embodiments, the switch arm 4 is capable of releasing the engagement between the first and second clamping units 1 and 2 when the switch arm 4 is subjected to external angle-changing force in either embodiment, providing automatic and safe measures.

[0062] With reference to FIGS. 16 and 17, a cord-securing device of a fourth embodiment according to the preferred teachings of the present invention includes two cord-securing devices of the first embodiment and utilizes a connection seat 5. The first clamping units 1 and 1', the second clamping units 2 and 2', the holding units 3 and 3', and the connection seat 5 of this embodiment are substantially identical to those of the first embodiment and therefore not described in detail to avoid redundancy.

[0063] Compared to the first embodiment, the upper cord-securing device (hereinafter referred to as "the second cord-securing device") of the fourth embodiment utilizes the engaging seat 41 of the switch arm 4 to connect the cord 831 and utilizes the first and second clamps 13 and 14 to clamp the engaging seat 41' of the switch arm 4' of the lower cord-securing device (hereinafter referred to as "the second cord device"). Furthermore, the first and second clamps 13' and 14' of the second cord-securing device are engaged with the coupling opening 511 of the connection seat 5. Thus, the cord 831 can be connected to the lower rail 84 fixed on a side of the shade 81 by the serially connected first and second cord-securing devices.

[0064] Specifically, the engaging seat 41' of the first cord-securing device is substantially cylindrical and includes top and bottom ends. The through-hole 411' is extended from the top end through the bottom end in a direction perpendicular to the longitudinal axis of the axle 43. Furthermore, the engaging seat 41' of the second cord-securing device is in the form of a flat plate and includes opposite first and second surfaces. A through-hole 411'' is extended from the first surface through the second surface of the engaging seat 411'' in a direction parallel to the longitudinal axis of the axle 43'. The cord 831 is extended through the through-hole 411. The first and second clamps 13 and 23 are engaged with each other at the through-hole 411' and are, thus, positioned. After the first cord-securing device clamps 13 and 14 are positioned on the second cord-securing device, the axle 43 of the first cord-securing device is perpendicular to the axle 43' of the second cord-securing device and the cord 831 is perpendicular to the first and second cord-securing devices.

[0065] By engaging the first and second cord-securing devices together with the axes 43 and 43' perpendicular to each other in this embodiment, when the cord 831 is subjected to external angle-changing force other than the original direction force, the engagement between the first and second cord-securing devices can be released when one or both of the switch arms 4 and 4' are rotated by the external force. Thus, an end of the cord 831 becomes a free end to avoid strangling of a playful child. Increased safety is provided regardless of the direction of the external force.

[0066] Conclusively, the cord-securing device according to the teachings of the present invention can be automatically released from the shade 81 when subjected to external angle-changing force, providing increased safety. The cord-securing device according to the teachings of the present invention is mounted to a side of a shade 81 via a connection seat 5, 6, 6' or to the lower rail 84 fixed on a side of the shade 81, such that the cord-securing device, when subjected to external angle-changing force other than the original direction force from the cord, can change its angle position in response to the external force, such that the cord-securing device can be rapidly detached from the shade in an emergency.

[0067] Thus since the invention disclosed herein may be embodied in other specific forms without departing from the spirit or general characteristics thereof, some of which forms have been indicated, the embodiments described herein are to be considered in all respects illustrative and not restrictive. The scope of the invention is to be indicated by the appended claims, rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are intended to be embraced therein.

What is claimed is:
1. A cord-securing device for a window shade comprising: a first clamping unit including a first extension portion, a first interconnecting portion, and a first clamp, with the first interconnecting portion having two opposite ends, with the first extension portion and the first clamp respectively connected to the two ends of the first inter-
connecting portion, with the first interconnecting portion further including an opening; a second clamping unit including a second extension portion, a second interconnecting portion, and a second clamp, with the second interconnecting portion having two opposite ends, with the second extension portion and the second clamp respectively connected to the two ends of the second interconnecting portion, with one end of the second extension portion extending through the opening and engaged with an end of the first extension portion;

a holding unit including a resilient member having two mutually facing arms, with the first and second extension portions engaged between the two arms of the resilient member; and

a switch arm including an engaging seat and an axle, with a cord of the window shade adapted to be attached to the engaging seat, with a pivotal portion extending from the engaging seat, with the axle fixed to the pivotal portion, with the axle rotatably positioned between the first and second extension portions, with the axle including first and second positioning end faces, with the switch arm pivotable to control the first and second positioning end faces of the axle to abut or not abut the first and second extension portions to control clamping or not clamping of the first and second clamps.

2. The cord-securing device as claimed in claim 1, with the axle including non-circular cross sections perpendicular to a longitudinal axis of the axle, with the axle having a major diameter and a minor diameter, with the major diameter perpendicular to a longitudinal axis of the axle and an extending direction of the cord, and with the minor diameter perpendicular to the major diameter and the longitudinal axis of the axle.

3. The cord-securing device as claimed in claim 2, with the axle including an annular limiting groove formed in an intermediate portion of the axle along the longitudinal axis.

4. The cord-securing device as claimed in claim 1, with the first extension portion and the first clamp extending away from each other from the two ends of the first interconnecting portion.

5. The cord-securing device as claimed in claim 4, with the second extension portion and the second clamp extending away from each other from the two ends of the second interconnecting portion.

6. The cord-securing device as claimed in claim 1, with the first extension portion including a first assembling face, with the second extension portion including a second assembling face facing the first assembling face, and with each of the first and second assembling face being an arcuate face.

7. The cord-securing device as claimed in claim 3, with the second extension portion including a second assembling face facing the first assembling face, and with each of the first and second assembling face being an arcuate face.

8. The cord-securing device as claimed in claim 6, with each of the first and second assembling face including an auxiliary positioning face at a bottom of the arcuate face, with the first and second positioning end faces of the axle respectively abutting the auxiliary positioning faces.

9. The cord-securing device as claimed in claim 7, with each of the first and second assembling face including an auxiliary positioning face at a bottom of the arcuate face, with the first and second positioning end faces of the axle respectively abutting the auxiliary positioning faces.

10. The cord-securing device as claimed in claim 8, with each of the first and second positioning end faces and the auxiliary positioning faces being a planar face.

11. The cord-securing device as claimed in claim 9, with each of the first and second extension portions including a protrusion formed on the auxiliary positioning face thereof, with the protrusions of the first and second extension portions aligned with each other and received in the annular limiting groove.

12. The cord-securing device as claimed in claim 1, with the pivotal portion including two pivotal arms extending from the engaging seat, with each of the two pivotal arms having a distal end, with the distal ends of the two pivotal arms aligned with and spaced from each other along the longitudinal axis of the axle, and with the distal ends of the two pivotal arms interconnected by the axle.

13. The cord-securing device as claimed in claim 12, with the first interconnecting portion having first and second abutment faces on opposite sides of the opening.

14. The cord-securing device as claimed in claim 13, with the distal end of each of the two pivotal arms including a pressing end face, with the pressing end faces aligned with and abutting the first and second abutment faces of the first interconnecting portion.

15. The cord-securing device as claimed in claim 1, with the end of each of the first and second extension portion including an engaging end having a first face, with the first faces of the engaging ends of the first and second extension portions facing each other, with the first face of the first extension portion including a plurality of first engaging sections, with the first face of the second extension portion including a plurality of second engaging sections engaged with the plurality of first engaging sections.

16. The cord-securing device as claimed in claim 1, with each of the first and second clamps including a clamping face and a coupling portion formed on the clamping face, and with the clamping faces of the first and second clamps facing each other.

17. The cord-securing device as claimed in claim 1, with the engaging seat including a through-hole, with the cord adapted to extend through and fixed in the through-hole.

18. The cord-securing device as claimed in claim 17, with the engaging seat including top and bottom ends, and with the through-hole extending from the top end through the bottom end in a direction perpendicular to the longitudinal axis of the axle.

19. The cord-securing device as claimed in claim 17, with the engaging seat including opposite first and second surfaces, with the through-hole extending from the first surface through the second surface of the engaging seat in a direction parallel to the longitudinal axis of the axle.

20. The cord-securing device as claimed in claim 1, further comprising: a connection seat including a base having first and second sides, with the connecting seat further including first and second wings formed on the first and second sides of the connection seat, and with the first and second wings of the connection seat adapted to be fixed to a side of a shade of the window shade.

21. The cord-securing device as claimed in claim 20, with the base including a coupling slot, and with the first and second clamps engaged with each other via the coupling slot.

22. The cord-securing device as claimed in claim 1, further comprising: a connection seat including a base and a platform, with the base adapted to be fixed to a side of a shade of the window shade, with the base including a first pivotal
portion, and with the base including a second pivotal portion rotatably engaged with the first pivotal portion.

23. The cord-securing device as claimed in claim 22, with the base including first and second wings on opposite sides of the first pivotal portion, and with the first and second wings adapted to be fixed to the side of the shade.

24. The cord-securing device as claimed in claim 22, with the first and second pivotal portions defining a pivot axis parallel to an extending direction of the cord.

25. The cord-securing device as claimed in claim 22, with the first and second pivotal portions defining a pivot axis perpendicular to an extending direction of the cord.

26. The cord-securing device as claimed in claim 25, with the first pivotal portion including an inner periphery, and with the base further including a plurality of disengagement preventing portions extending radially from the inner periphery of the first pivotal portion.

27. The cord-securing device as claimed in claim 26, with the second pivotal portion including an outer periphery, with the platform including a plurality of lugs extending radially from the outer periphery of the second pivotal portion.