

SPECIFICATION

Louvered venetian blind with vertical louvers

The invention relates to a louvered venetian blind with vertically arranged louvers.

- 5 A venetian blind of this type has in most cases several carriers which each carry one louver and can be moved on a rail. Each carrier has a drive hub which is rotatable about a vertical axis and usually forms part of a gear wheel or worm wheel.
- 10 A drive transmitted to the drive hub, usually by a worm, effects a rotary motion of the drive hub, and hence of the louver holder, and the turning of the louver. The louver hanger usually has an upper part which passes through the drive hub. On the
- 15 upper edge of the drive hub, a guide surface is formed on which rests at least one holding part of the louver hanger.
- In hitherto known embodiments of a louvered venetian blind of this type, there is a risk that
- 20 damage in the form of deformations or even in the form of fractures occurs in the zone of the turning drive or on the louver hanger or the louver itself, when the louver is subjected to uncontrolled rotary loading acting from the outside.
- 25 According to the present invention, we provide a louvered venetian blind comprising a rail, several carriers each carrying one vertically arranged louver, the carriers being able to be moved along the rail and each having a drive hub which is
- 30 rotatable about a vertical axis and preferably forms part of a gear or wormwheel, a louver hanger for each louver which is actuated by the rotary motion of the associated drive hub and effects the turning of the louver and the upper part of which
- 35 passes through the drive hub, a guide surface formed on the upper edge of the drive hub and on which rests at least one holding part associated with the louver hanger, wherein the guide surface
- 40 having, at each of two diametrically opposite points, a depression within which the holding part of the louver hanger is located when the louver is not subject to the action of an external force, so that the hanger is taken along by the rotary motion of the drive hub, the guide surface also having, at
- 45 each of two diametrically opposite points which are offset by about 90° to the depressions, a peak, with ramps which rise relative to the horizontal in both directions, and wherein at least one resilient stop is provided adjacent each peak, and which is
- 50 abutted by a portion of the hanger, normally to prevent said portion from rotating past said stop, but permitting rotation between the louver hanger and the drive hub to continue in the same direction after a rotary loading of predetermined
- 55 magnitude, exerted on the louver from the outside, has been exceeded.

With such a construction uncontrolled rotary loading exerted at any time on the louver from the outside cannot lead to damage on the louver

- 60 holder and the turning drive.
- A louvered venetian blind designed according to the invention thus has, in the zone of the turning drive for the louvers, an overload protection which permits a further rotation of the

- 65 louver hanger and hence of the louver in the same direction, when a rotary loading of predetermined magnitude, exerted on the louver from the outside, is exceeded, without the louver or the other parts of the turning drive having to absorb corresponding loading forces. In this way, the occurrence of damage in cases of this kind is reliably prevented. After the overload protection has responded, the obliquely running parts of the
- 70 guide surfaces have the effect that, depending on the construction, by means of which the louvers are joined to one another, at least the upper side of the louver comes in every case into a position which is parallel to the remaining louvers. Moreover, the manufacturing costs required to
- 75 realise such a construction are relatively small.

The louver hanger can be suspended, and guided, on both sides in the drive hub.

- Advantageously said resilient stop is provided in each case on the inside of the drive hub and
- 85 another stop is provided on that part of the louver hanger which passes through the drive hub, and these stops are designed with respect to their dimensions and to the elasticity of the material in such a way that they permit the relative motion
- 90 between the louver hanger and the drive hub to continue in the same direction after a relative rotation up to mutual contact and after a rotary loading of predetermined magnitude, exerted on the louvers from the outside, has been exceeded.

- 95 When the stops come into mutual contact during a rotation of the louver and the louver hanger effected by an external rotary loading, the relative rotation of the stops with respect to one another is admittedly stopped initially. If, however,
- 100 the external rotary loading disappears at this stage, the louver holder slides back, by means of its holding part, over the inclined ramp surface into the original normal relative position. If, however, the torque exerted by one stop on the
- 105 other stop exceeds a predetermined magnitude, the stops and partially also the parts joined thereto will be deformed due to their resilience to such an extent that one stop can pass the other and the relative rotation is continued in the same direction.
- 110 In particular when plastic is used for the manufacture of these parts, the resilience can be predetermined in a simple manner.

- It is also advantageous for these stops to be provided at two diametrically opposite points and
- 115 to each be located in that circumferential zone of which the generating lines, parallel to the axial direction, pass through the peaks of the guide surfaces at the upper edge of the drive hub.

- Thus, two pairs of stops cooperate at two
- 120 diametrically opposite points, as a result of which a substantially symmetrical load absorption is ensured.

- In one embodiment of the invention the stops on the hanger are formed in the cross-sectional
- 125 shape of arms forming the holding parts of the hanger, these holding parts having downwardly extending projections which slide along the ramps between the peaks and depressions. The stops can all have a triangular cross-section.

Advantageously it is proposed that the part of the louver hanger which passes through the drive hub, has two preferably diametrically opposite resilient projections which, after this part has been passed through the drive hub, automatically spring out, by expansion, above the upper edge of the drive hub, which upper edge preferably forms at least one of said guide surfaces.

In this way, the assembly of the louvered venetian blind designed according to the invention is particularly facilitated. The resiliently arranged projections automatically spring back over the guide surfaces, after the upper part of the louver hanger has been pushed through the drive hub, so that further holding and connecting elements are not necessary. Moreover, this embodiment of the invention can also be used with advantage for other designs of a louvered venetian blind, independently of the shaping of the upper edge of the drive hub and of the use of an overload protection.

Preferably the holding part of the louver hanger, which part serves for coupling the louver hanger to the drive hub, comprises a part, which is substantially cylindrical in the zone of the drive hub, and two arms, which are adjacent thereto, are separated from one another by a slot and each have an outward-pointing projection.

Due to the slot, the arms obtain adequate space for moving in the radial direction and adequate resilience.

The arms can be joined at their upper ends to form a bracket. This joining facilitates the introduction of the two arms into the drive hub and also ensures a certain amount of rigidity in the upper arm zone.

The projections which seat on the guide surface can be formed on their underside in the shape of a wedge and with an acute edge running in the radial direction, in which case the magnitude, to be selected, of the wedge angles should be matched to the angle of inclination of the guide surfaces. Smooth running of this rotating joint can then always be achieved.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:

FIGURE 1 is a diagrammatic side view of one embodiment of louvered venetian blind according to the invention;

FIGURE 2 is an exploded perspective view of suspension for a louver of the blind, the suspension being formed from a louver hanger and a drive hub;

FIGURE 3 is a perspective view, to a larger scale, of the louver suspension according to Figure 2 after the two parts have been pushed together; and

FIGURE 4 is a plan view of the suspension of FIGURE 3 but without the lower part of the louver hanger.

Referring to Figure 1, the vertical blind includes an upper rail 10, on which two louver packs are suspended, each of which has a pull carrier 11 and

a number of louver carriers 12 on each of which one louver 13 is suspended. A drive shaft 15 passes through all the carriers 11 and 12, of which each part associated with a louver pack is provided with three helical grooves 16 or 17. The three grooves 16 and 17 associated with one louver pack are wound in one hand, and the three grooves associated with the other pack are of the opposite hand so that, on rotating the drive shaft 15, the louver packs move in opposite directions.

The drive shaft 15 can be rotated by means of a chain 18. Support carriers 14 are provided to support the part of the drive shaft 15 between the louver packs on the rail 10 and thus prevent sagging of the drive shaft 15.

The pull carrier 11 is in each case directly connected to the next louver carrier 12 of its louver pack. The force required for the axial movement is transmitted from the drive shaft 15 only to the pull carriers 11, whilst the louver carriers 12 only take the particular driving force, required for the turning step, from the drive shaft 15. The axial movement of the louver carriers 12 is effected by strips 19 which are connected to pull carriers and pass through the louver carriers 12. The strips 19 have abutments, on the end remote from the carrier to which they are connected, which engage stops on the louver carriers, so that a lost motion connection is provided between adjacent carriers. The louver carriers 12 run on the rail 10 with the aid of rollers 35.

In each louver carrier 12, a turning drive is provided which is formed by a worm, which is not shown here and is placed onto the drive rail 15, and by a worm wheel 20 interacting with this worm. The worm wheel has a hollow hub 21. A louver hanger 22 has, in its lower zone, a hook 23 into which a louver 13 is hung in each case. The louver is shown only in Figure 1 but not in Figures 2-4.

An upper part 24 of the louver hanger 22 is of cylindrical shape over a substantial part of its length, which part is surrounded by the hub 21 in the assembled state, and then continues in the form of two arms 25 which are separated from another by a slot 26. The diametrically opposite arms 25 are joined at their upper ends to form a bracket of rounded shape.

The arms 25 continue from their cylindrical part 24 in an approximately triangular cross-section so that they form a stop 27, the acute edge of which points radially outwards.

Above the two stops 27, the arms 25 each have a radially outward-pointing projection 28, the cross-section of which has a wedge-like form on the underside and an acute edge running in the radial direction. The cylindrical part 24 with the arms 25 and the projections 28 thus forms the holding part of the louver holder 22, by means of which the latter is fixed to the hub 21.

The two projections 28 likewise are located at two diametrically opposite points. Due to the inherent elasticity of the plastic used here and due to the slot 26 and the other dimensions in this

zone of the louver hanger 22, the arms 25 can be pressed together to such an extent that their projections 28 have a smaller external distance in the direction of the diameter. This makes it possible for the part 24 of the louver holder 22, including its arms 25 and the projections 28, to be passed through the hollow hub 21 of the worm wheel 20. After they have been passed through in this way, the arms 25 again spring back into their original position so that the projections 28 can automatically overlap the upper edge of the hub 21.

This upper edge of the hub 21 has at each of two diametrically opposite points a depression 29. Starting from the latter, parts of a guide surface 30, which parts form ramps inclined relative to the horizontal, extend in each case on both sides. Due to this rise, a peak 31 is formed in each case at two likewise diametrically opposite points which are offset by 90° relative to the depressions.

These peaks 31 are associated with inward-pointing stops 32 which likewise have an approximately triangular cross-section and which project into the clear interior of the hub 21. The diametrically opposite stops 32 are dimensioned and matched to the form of the stops 27 in such a way that, when a relative rotation occurs between the louver hanger 22 and the hub 21, one stop 27 can in each case abut with one stop 32 and the stops 27 and 32 can only pass one another due to the elasticity of the material and the constructional dimensions, when a stop momentum of predetermined magnitude is exceeded.

In use, a louver hung into the louver holder 22 is in its normal position relative to the hub 21 of the worm wheel 20, when the projections 28 on the arms 25 are each in the depressions 29. In this position, a louver 13 which is not influenced by external forces in a rotary sense is taken along by a rotary motion exerted on the worm wheel 20, by means of which motion the turning step of a louver is effected.

When a rotary loading is exerted from the outside on the louver joined to the louver holder 22, the louver hanger 22 can initially rotate relative to the hub 21 until the stops 27 and 32 are in contact with one another, the projections 28 passing along the obliquely rising parts of the guide surface 30 up to the two highest zones 31. The louver hanger 22 and the louver 13 joined thereto are thus correspondingly lifted a little. If the rotary loading exerted from the outside on the louver 13 should reach an unduly high value, the stops 27 and 32 on the two diametrically opposite points can pass one another. The overload protection formed by these stops 27 and 32 has thus responded and prevented possible damage to the louver or the remaining parts of the turning drive, due to overloading. After this overload protection has responded, the louver is in every case automatically guided back again into a position which is parallel to the original starting position and hence to the normal position, so that there is no interference with the interaction of the

louvers in the particular louver pack.

If the louver holder 22 should be lifted only a little, it slides back again by gravity into its original normal position after the rotary loading has ended.

70 CLAIMS

1. A louvered venetian blind comprising a rail, several carriers each carrying one vertically arranged louver, the carriers being able to be moved along the rail and each having a drive hub which is rotatable about a vertical axis and preferably forms part of a gear or wormwheel, a louver hanger for each louver which is actuated by the rotary motion of the associated drive hub and effects the turning of the louver and the upper part of which passes through the drive hub, a guide surface formed on the upper edge of the drive hub and on which rests at least one holding part associated with the louver hanger, wherein the guide surface having, at each of two diametrically opposite points, a depression within which the holding part of the louver hanger is located when the louver is not subject to the action of an external force, so that the hanger is taken along by the rotary motion of the drive hub, the guide surface also having at each of two diametrically opposite points which are offset by about 90° to the depressions a peak, with ramps which rise relative to the horizontal in both directions, and wherein at least one resilient stop is provided adjacent each peak, and which is abutted by a portion of the hanger, normally to prevent said portion from rotating past said stop, but permitting rotation between the louver hanger and the drive hub to continue in the same direction after a rotary loading of predetermined magnitude, exerted on the louver from the outside, has been exceeded.

2. A louvered venetian blind according to claim 1, wherein said resilient stop is provided in each case on the inside of the drive hub and another stop is provided on that part of the louver hanger which passes through the drive hub, and these stops being designed with respect to their dimensions and with respect to the elasticity of the material in such a way that they permit the relative motion between the louver hanger and the drive hub to continue in the same direction after a relative rotation up to mutual contact and after a rotary loading of predetermined magnitude, exerted on the louvers from the outside, has been exceeded.

3. A louvered venetian blind according to claim 2, wherein these stops are provided at two diametrically opposite points and are each located in that circumferential zone, of which the generating lines, parallel to the axial direction, pass through the peaks of the guide surface at the upper edge of the drive hub.

4. A louvered venetian blind according to claim 2 or 3, wherein the stops on the hanger are formed in the cross-sectional shape of arms forming the holding parts of the hanger, these holding parts having downwardly extending projections which slide along the ramps between



zone of the louver hanger 22, the arms 25 can be pressed together to such an extent that their projections 28 have a smaller external distance in the direction of the diameter. This makes it possible for the part 24 of the louver holder 22, including its arms 25 and the projections 28, to be passed through the hollow hub 21 of the worm wheel 20. After they have been passed through in this way, the arms 25 again spring back into their original position so that the projections 28 can automatically overlap the upper edge of the hub 21.

This upper edge of the hub 21 has at each of two diametrically opposite points a depression 29. Starting from the latter, parts of a guide surface 30, which parts form ramps inclined relative to the horizontal, extend in each case on both sides. Due to this rise, a peak 31 is formed in each case at two likewise diametrically opposite points which are offset by 90° relative to the depressions.

These peaks 31 are associated with inward-pointing stops 32 which likewise have an approximately triangular cross-section and which project into the clear interior of the hub 21. The diametrically opposite stops 32 are dimensioned and matched to the form of the stops 27 in such a way that, when a relative rotation occurs between the louver hanger 22 and the hub 21, one stop 27 can in each case abut with one stop 32 and the stops 27 and 32 can only pass one another due to the elasticity of the material and the constructional dimensions, when a stop momentum of predetermined magnitude is exceeded.

In use, a louver hung into the louver holder 22 is in its normal position relative to the hub 21 of the worm wheel 20, when the projections 28 on the arms 25 are each in the depressions 29. In this position, a louver 13 which is not influenced by external forces in a rotary sense is taken along by a rotary motion exerted on the worm wheel 20, by means of which motion the turning step of a louver is effected.

When a rotary loading is exerted from the outside on the louver joined to the louver holder 22, the louver hanger 22 can initially rotate relative to the hub 21 until the stops 27 and 32 are in contact with one another, the projections 28 passing along the obliquely rising parts of the guide surface 30 up to the two highest zones 31. The louver hanger 22 and the louver 13 joined thereto are thus correspondingly lifted a little. If the rotary loading exerted from the outside on the louver 13 should reach an unduly high value, the stops 27 and 32 on the two diametrically opposite points can pass one another. The overload protection formed by these stops 27 and 32 has thus responded and prevented possible damage to the louver or the remaining parts of the turning drive, due to overloading. After this overload protection has responded, the louver is in every case automatically guided back again into a position which is parallel to the original starting position and hence to the normal position, so that there is no interference with the interaction of the

louvers in the particular louver pack.

If the louver holder 22 should be lifted only a little, it slides back again by gravity into its original normal position after the rotary loading has ended.

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1. A louvered venetian blind comprising a rail, several carriers each carrying one vertically arranged louver, the carriers being able to be moved along the rail and each having a drive hub which is rotatable about a vertical axis and preferably forms part of a gear or wormwheel, a louver hanger for each louver which is actuated by the rotary motion of the associated drive hub and effects the turning of the louver and the upper part of which passes through the drive hub, a guide surface formed on the upper edge of the drive hub and on which rests at least one holding part associated with the louver hanger, wherein the guide surface having, at each of two diametrically opposite points, a depression within which the holding part of the louver hanger is located when the louver is not subject to the action of an external force, so that the hanger is taken along by the rotary motion of the drive hub, the guide surface also having at each of two diametrically opposite points which are offset by about 90° to the depressions a peak, with ramps which rise relative to the horizontal in both directions, and wherein at least one resilient stop is provided adjacent each peak, and which is abutted by a portion of the hanger, normally to prevent said portion from rotating past said stop, but permitting rotation between the louver hanger and the drive hub to continue in the same direction after a rotary loading of predetermined magnitude, exerted on the louver from the outside, has been exceeded.

2. A louvered venetian blind according to claim 1, wherein said resilient stop is provided in each case on the inside of the drive hub and another stop is provided on that part of the louver hanger which passes through the drive hub, and these stops being designed with respect to their dimensions and with respect to the elasticity of the material in such a way that they permit the relative motion between the louver hanger and the drive hub to continue in the same direction after a relative rotation up to mutual contact and after a rotary loading of predetermined magnitude, exerted on the louvers from the outside, has been exceeded.

3. A louvered venetian blind according to claim 2, wherein these stops are provided at two diametrically opposite points and are each located in that circumferential zone, of which the generating lines, parallel to the axial direction, pass through the peaks of the guide surface at the upper edge of the drive hub.

4. A louvered venetian blind according to claim 2 or 3, wherein the stops on the hanger are formed in the cross-sectional shape of arms forming the holding parts of the hanger, these holding parts having downwardly extending projections which slide along the ramps between



the peaks and depressions.

5. A louvered venetian blind according to claim 2, 3 or 4 wherein the stops all have a triangular cross-section.

5 6. A louvered venetian blind according to any preceding claim wherein the part of a louver hanger which passes through a drive hub has two opposite resilient projections which, after this part has been passed through the drive hub, automatically spring out above the upper edge of the drive hub.

10 7. A louvered venetian blind according to claim 6, in which said upper edge forms at least one of said guide surfaces.

15 8. A louvered venetian blind according to claim 6 or 7, wherein the holding part of the louver hanger, which part serves for coupling the louver

hanger to the drive hub, comprises a part which is substantially cylindrical in the zone of the drive hub and two arms which are adjacent thereto, are separated from one another by a slot, each arm having an outward-pointing projection.

20 9. A louvered venetian blind according to claim 8, wherein the arms are joined at their upper ends to form a bracket.

25 10. A louvered venetian blind according to claim 8 or 9 wherein said projections are formed on their undersides in the shape of a wedge having an acute edge running in the radial direction.

30 11. A louvered venetian blind substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.