ABSTRACT

A drive arrangement for roller blinds of motor vehicles is provided. The drive arrangement includes a housing that contains a chamber for accommodating a spring steel band that is pre-formed in a spiral shape in a similar manner to a clockwork spring. The spring steel band is equidistantly perforated in the longitudinal direction and moves over a drive gear that is configured similarly to a barbed wire and driven by a geared motor. The projections of the drive gear engage with the holes of the spring steel band.
ROLLER BLIND WITH PERFORATED BAND DRIVE

FIELD OF INVENTION

[0001] This invention relates to roller blinds for motor vehicles and more particularly to a drive arrangement for such roller blinds.

BACKGROUND OF THE INVENTION

[0002] Remote-controlled window shades in motor vehicles require a motorized drive. Due to the fact that the roller blind consists of a non-rigid material, the roller blind cannot be pushed so that the far edge of the roller blind relative to the winding shaft must be moved away from the winding shaft in suitable fashion.

[0003] This is the reason that the winding shaft for the window shade is prestressed in the wind-up direction of the roller blind by means of a spring drive using arrangements that are known from the state of the art. In order to unwind the roller blind in front of a window, the roller blind is provided with a pull rod having ends that are guided in guide rails. The guide rails simultaneously serve for guiding in a buckle-free manner toothed racks that have teeth all around their surface. The toothed racks mesh with a corresponding gearwheel of the drive motor and are thus able to move the pull rod away from the winding shaft against the effect of the spring drive.

[0004] The toothed racks are relatively deflection-resistant in all directions such that the idle segment of the toothed rack must be guided in a special storage tube. The storage tube is installed in the car body beneath the rear window, in the roof or in the doors and therefore requires substantial installation expenditures.

OBJECTS AND SUMMARY OF THE INVENTION

[0005] In view of the foregoing, a general object of the present invention is to provide a drive arrangement for window blinds in motor vehicles that has a very compact design.

[0006] According to one embodiment of the invention, the drive arrangement comprises a spring steel belt that is perforated at equal intervals over its length. The spring steel band is pre-formed in such a way that it forms a spiral band in the relaxed state. Thus, the windings of the flat spiral spring can lie flatly on one another for space reasons. The non-functional end of the spring steel band is located in the interior of the spiral while the end used for driving the roller blind lies on the outside of the spiral.

[0007] In order to move the spring steel band, the inventive drive arrangement features a drive gear that is provided with a number of projections on its outer circumference. These projections positively engage with the perforations of the spring steel band. The drive gear is configured similarly to a sprocket and driven with the aid of a geared motor. The driven gear is mounted on the output shaft of the geared motor. In addition, a mechanism is provided for maintaining the spring steel band and the drive gear in the engaged state.

[0008] As a result, the idle segment of the spring steel band used for moving the roller blind is wound up spirally and therefore can be accommodated in a space-saving manner. All that is necessary to accommodate the idle segment is a small chamber in the immediate vicinity of the gear housing of the drive motor. This makes it possible to eliminate the additional installation steps for installing the idle tubes required by the state of the art.

[0009] Since the spring steel band has a natural tendency to form a spiral due to its pre-formed shape, this spiral is accommodated in the corresponding chamber in a generally unrestricted fashion, i.e., with a certain amount of play. When the perforated band is pushed back into the chamber, the bending force in the spring steel band inevitably causes the belt to form a spiral-shaped roll and to replenish the spiral due to its radial growth.

[0010] If the perforated band were not pre-formed in a spiral, the force for creating the spiral would have to be derived from the thrust with which the perforated band is pushed back into the chamber. This would result in the spiral becoming jammed in the housing. Such a self-locking effect is effectively prevented by configuring the spring steel band in the form of a spiral.

[0011] In order to generate a high thrust in a buckle-proof manner with the spring steel band, it is advantageous if the spring steel band is only curved in the longitudinal direction. In this respect, it is also preferred that the axis of curvature lies on the side of the spiral-shaped structure.

[0012] The free edge of the roller blind may be pulled or pushed by the inventive arrangement.

[0013] A guiding arrangement may be provided in order to guide the spring steel band without buckling when it is subjected to pressure. A guiding arrangement that causes a general extension of the working segment of the spring steel band is also practical when the spring steel band is subjected to a tensile load.

[0014] The guiding arrangement may comprise a guide rail. This guide rail may be configured without undercutts, wherein one narrow side of the spring steel band points in the direction of the groove slot. The guide rail may also feature an undercut guide groove, wherein one flat side of the spring steel band points in the direction of the groove slot.

[0015] The spring steel band may be coupled to the roller blind either directly or via a rope.

[0016] The drive arrangement may feature a housing on which the geared motor is fixed, wherein said housing is provided with a mechanism for ensuring that the spring steel band remains engaged with the driving gear. The mechanism for ensuring that the spring steel band remains engaged with the driving gear may comprise a cutout in a channel that extends around the driving gear by a certain wrap angle. One wall of the channel can be formed by the outer circumferential surface of the driving gear and the other wall can be formed by the housing. This housing wall can contain a groove, through which the projections of the driving gear extend when they protrude over the rear side of the spring steel band in the region of the wrap.

[0017] If the wrap angle is kept extremely small, the new drive arrangement can provide an overload protection or an anti-catching protection. For example, if the pressing mechanism for the spring steel band on the driving gear and the projections are designed accordingly, the projections are able to push back the spring steel band and thereby disengage from the holes of the perforation in order to limit the thrust and thus realize an anti-catching protection. Advantageous conditions can be achieved if the projections are configured in the shape of a spherical cap, a cone or a truncated cone.

[0018] The height of the projections can amount to 0.8-times to 1.5-times the thickness of the spring steel band.
[0019] The drive arrangement of the invention is suitable for various types of motor vehicle window blinds. It is practical if a pull rod is assigned to the window blind. The pull rod can be fixed on the edge that travels the greatest distance when the roller blind is extracted and retracted. The pull rod may be guided in guide rails on one or both ends, with the pull rod cooperating with the described drive arrangement.

[0020] The inventive drive arrangement may also be used in connection with window blinds that feature one or more support rods. Window blinds of this type are used, for example, on side windows. The support rod or rods are vertically guided in guide elements underneath the lower window edge. Their movable free end is connected to the pull rod such that the support rod makes it possible to move the pull rod from the lower window edge in the direction of the upper window edge without any additional guide elements. In this case, the support rod absorbs the required lateral guiding forces as well as the forces of pressure exerted upon the pull rod by the support rod.

[0021] The support rod is extracted and retracted with the aid of the inventive drive arrangement. In this case, the drive arrangement engages on the far end of the support rod relative to the pull rod.

[0022] The inventive drive arrangement may be positioned at the location in which the end of the support rod that always remains in the door paneling is located in the extracted or retracted position of the window blind.

[0023] The following description of the figures and preferred embodiments of the invention is provided for a better understanding of the invention. A person skilled in the art will be able to ascertain any details that are not described below from the figures. It will be apparent to those skilled in the art that numerous modifications are possible.

[0024] The figures are not necessarily drawn to scale. Certain areas of the figures may be greatly enlarged in order to elucidate specific details. Furthermore, the drawings are markedly simplified and do not contain all details of a practical embodiment. The terms top and bottom or front and rear refer to the normal installation position or the normal terminology with respect to motor vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. 1 is a partially cutaway rear perspective view of the rear passenger compartment of an exemplary motor vehicle equipped with a rear window blind according to the present invention.

[0026] FIG. 2 is a highly schematic plan view of the rear window blind of FIG. 1.

[0027] FIG. 3 is a partially exploded perspective view of one of the two drive arrangements for operating the rear window blind of FIG. 2.

[0028] FIG. 4 is a highly schematic, partially cutaway perspective view of the right rear door of the motor vehicles showing a window blind with a support rod.

[0029] FIG. 5 is a simplified, exploded, perspective view of a window blind drive according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0030] Referring now to FIG. 1 of the drawings, a rear seat region of an exemplary passenger car is shown. The right inner side of the rear seat region is shown, which is configured as a mirror image of the not-shown left inner side. If not indicated otherwise, the description of the right side of the car body also applies to the left side of the car body. FIG. 1 is simplified in that, for example, car body structures such as reinforcements and mounting elements are not illustrated because they are not essential for understanding the invention.

[0031] The car body section 1 shown features a roof 2. A C-column 3 extends laterally downward from the roof to a floor assembly. A corresponding C-column is also arranged on the other side of the motor vehicle. The C-column 3 is provided on its inner side with a trim panel 4. The roof 2 transitions on its rear edge into a rear window 5. The upper side of the rear window is defined by an upper window edge 6. However, only a section 7 of the lateral edges of the lateral edges of the window are shown in FIG. 1. This section 7 transitions into the upper window edge 6 in a corner region 8.

[0032] The width of the rear window 5 is greater at the height of the midsection of the car body than in the region of the upper window edge 6. A B-column 9, on which a right rear door 11 is conventionally hinged, is arranged a certain distance from the C-column 3. The right rear door 11 contains a window cutout 12 that is divided into an essentially rectangular section 14 and an approximately triangular section 15 by a vertical brace 13. The vehicle interior further includes a rear bench seat 15 with a seating surface 16 and a backrest 17. The seating surface 17 rests on the floor assembly 18. A rear window shelf 19 extends between the upper rear edge of the rear backrest 17 and the rear window 5.

[0033] The rear window 5 is provided with a rear window blind 21 of which only the roller blind 22 is illustrated in FIG. 1. The side window 12 is also provided with window blinds, namely with a roller blind 22 in the rectangular window section 14 and a roller blind 24 in the triangular section 15.

[0034] A highly schematic representation of the design of the rear window blind 21 in FIG. 2. As shown in FIG. 3, the rear window blind 21 includes two guide rails 27 and 28 that are mirror images of one another, the roller blind 22, a winding shaft 31 and two drive elements 32 and 33. The two guide rails 27 and 28 extend laterally relative to the rear window 5 approximately parallel to one another. The guide rails are curved in a plane, with the plane of curvature lying parallel to the plane of projection of FIG. 1 on the inner side of the rear window 5.

[0035] Since the two guide rails 27, 28 are mirror images of one another, it suffices to merely describe one guide rail in detail. According to this FIG. 2, the guide rail 28 features a guide groove 34 without undercut which opens in the direction of the opposite guide rail 27 with a groove slot 35. The guide rails 27, 28 serve for guiding a pull rod 36, the ends of which penetrate the grooves 34 of the two guide rails 27, 28. The connection between the pull rod 36 and the roller blind 22 is realized by providing the front edge of the roller blind with a tubular loop 37, through which the pull rod 36 extends. In the illustrated embodiment, the pull rod 36 is in the form of a simple flat metal rod. The width of the guide groove 34 corresponds to the thickness of the pull rod 36 on the flat sides.

[0036] The far end of the roller blind 22 relative to the pull rod 36 is fixed on the winding shaft 31. The roller blind has an approximately rectangular shape and its size corresponds to that of the rear window 5. The winding shaft 31 is rotatably supported underneath the rear window shelf 19 by journals 38, 39. The winding shaft is realized in tubular fashion and contains a spring drive 41 in its interior. The spring drive is
fixed on the winding shaft 31 at the location designated by reference symbol 42 and connected to the rotationally rigid journal 38 at its other end 43. The spring drive 41 pre-stresses the winding shaft 31 in the direction in which the roller blind 22 is wound on the winding shaft 31.

[0037] The following description of the two drive arrangements 32, 34 also refers to FIG. 3. The drive arrangement 33 includes a perforated band 45 in the form of a spring steel band with ends 46 and 47. The spring steel band is provided with longitudinal perforations in the form of holes 48 in uniform intervals. The holes 48 are in the form of round holes.

[0038] The spring steel band 45 is pre-formed so that it forms a spiral 49 in the unstressed state as illustrated in FIG. 3. The individual layers of the formed flat spiral spring are arranged tightly adjacent to one another within the spiral 49. The end 47 is located within the spiral 49.

[0039] The spring steel band 45 may also be pre-formed so that it is slightly curved relative to the axis of curvature lying parallel to the longitudinal direction of the spring steel band 45. Curvature appears at the location at which the spring steel band 45 is wound up into a spiral; in this instance, the concave side faces the spiral 49.

[0040] The drive of the perforated band 45 is provided by a geared motor 50. A driving gear 53 is mounted on the output shaft 51 of the geared motor 50 so that the driving gear rotates with the output shaft. The driving gear 52 basically consists of a cylindrical disk. The outer circumferential surface 53 of the driving gear is provided with projections 54 that are arranged at equidistant intervals. The projections 54 are in the form of spherical caps, truncated cones or pointed cones. Their spacing along the circumference 53 of the driving gear 52 corresponds to the spacing between the holes 48.

[0041] The geared motor 50 is flanged to a housing 55 that features a specially designed interior 56. The interior 56 forms an approximately cylindrical chamber 57 for accommodating the spiral 47 on the end located adjacent to the guide rail 28. On its opposite end, the interior 56 features another approximately cylindrical chamber 58 that is defined by a partially cylindrical inner wall 59. The driving gear 52 rotates in the chamber 58. The axis of the driving gear 51 is aligned parallel to the spiral 57 and separated therefrom by a housing partition 60 that ends on the upper side 61.

[0042] The chamber 58 is open toward the lower side, i.e., in the direction extending away from the observer of the figure, such that the perforated band 45 can extend out of the chamber at this location. As shown in FIG. 3, the spiral 49 lies in the chamber 57. The outer layer of the perforated band 45 extends from this chamber to the driving gear 52 over the upper side 61 of the partition 60. The perforated band 45 is wound around the driving gear 52 by about 180° in the chamber 58. The perforated band 45 extends out of the housing 55 on the underside and then into the groove slot 34 of the guide rail 28.

[0043] The chamber wall 59 extends around and is slightly spaced radially apart from the circumferential surface 53 of the driving gear 52 at the location at which the spring steel band 45 is wrapped around the driving gear 52. The spacing between the chamber wall 59 and the outer circumferential surface 53 is less than the height of the projections 54. In order to create space for the projections 54, a corresponding groove extends along the chamber wall 59 in the circumferential direction of the driving gear 52. This groove is not visible in the figure due to the sectional representation. The chamber wall 59 therefore acts as a pressing mechanism for ensuring that the projections 54 also remain engaged with the holes 48 under pressure, i.e., for preventing the spring steel band 45 from lifting off the outer circumferential surface 58 under pressure to such a degree that the projections 54 are disengaged from the holes 48.

[0044] As shown in FIG. 2, the active free end 46 of the spring steel band 45 is connected in a compression-proof and tension-proof manner to the end of the pull rod 36 located in the guide groove 34, namely by a rivet 63. The flat sides of the spring steel band 45 lie parallel to the flat sides of the guide groove 34 that do not feature undercuts. The drive arrangement 32 is a mirror image of the drive arrangement 33 and located on the bottom end of the guide rail 27, i.e., underneath the rear window shelf 19.

[0045] Aspects of the arrangement of the individual parts that were not already described above can be ascertained from the following functional description and the figures.

[0046] With respect to the functional description, it is assumed that the roller blind 22 is completely wound on the winding shaft 31, i.e., the edge provided with the pull rod 36 is located in the slot of the rear window shelf 19. In this state, the spring steel band 45 is wound as far as possible in the chamber 57. The outside diameter of the spiral 47 at this location is smaller than the diameter of the chamber 57. Since the spring steel band 45 is spirally preformed, the spiral 47 only adjoins the wall of the chamber 57, namely the partition 60, in the region in which the spring steel band 45 is unwound from the spiral 49. Due to its inherent elasticity, the spring steel band has a constant tendency to wind up from the end 47 so that the spiral 48 constantly presses against the partition 60 that is adjoined by the spiral 49 in the vicinity of the upper side 61.

[0047] The spring steel band 45 extends out of the chamber 57 through a slot in the chamber 58 that is defined by the upper side of the partition 61. The spring steel band is held such that it always adjoins the outer circumferential surface 52 of the driving gear 51 at this location by the chamber wall 59. The spring steel band 45 then extends into the guide rail 28 adjacent to the lower side. The spring steel band may also be additionally guided in the region between the guide rail 28 and the underside of the housing. The guiding elements required for providing this additional guidance are not illustrated in FIG. 3 in order to provide a better view of the spring steel band 45.

[0048] In order to extract the window blind 21 from the position shown, the user actuates a corresponding switch in the motor vehicle so that the geared motors 50 of the two drive arrangements 32 and 33 are simultaneously set in rotation, but in opposite directions. With respect to the drive arrangement 33 shown in FIG. 3, the driving gear 52 thus turns in the clockwise direction. Due to the positive engagement between the projections 54 and the holes 48, the driving gear 52 unwinds the spring steel band 45 from the spiral 49 and advances the spring steel band in the guide rail 28. Since the spring steel band 45 is configured so as to be buckle-proof relative to the flat sides, it pushes the pull rod 36 in front of itself against the force of the spring drive 41. Due to the geometry of the spring steel band 45, its narrow side cannot laterally disengage from the groove slot 35.

[0049] Since both geared motors 48 rotate at the same speed, they push the pull rod 36 uniformly forward, wherein the pull rod is moved toward the far end of the two guide rails 26 and 27 parallel to the winding shaft 31. The far ends of the
two guide rails 26, 27 are located on the upper side of the rear window 5, i.e., in the vicinity of the roof.

[0050] During the extraction movement, the thrust exerted by the spring steel band 45 has the tendency to buckle the spring steel band 45 on its flat side. However, this buckling is prevented in that the spring steel band 45 is concavely pre-formed in the longitudinal direction so that a partially cylindrical channel is formed in connection with the lateral surfaces or sides of the guide groove 34. Consequently, it is easy to generate the required thrust for unwinding the roller blind 22 from the winding shaft 31.

[0051] When the window blind 21 is completely extruded, a small segment that amounts to two or three turns of the spiral 49 remains in the chamber 57 in order to simplify the rewinding of the spiral 49.

[0052] In order to retract the roller blind 22, the geared motors 48 are actuated in opposite directions of rotation. With respect to the drive arrangement 33, the driving gear 52 hence now returns in the counterclockwise direction. During this movement, the working segment of the spring steel band 45 is retracted from the guide rail 28 in the direction of the driving gear 52. The corresponding edge of the roller blind 22 follows this synchronous return movement of both spring steel bands 45 of the two drive arrangements 32 and 33. The spring drive 41 winds the roller blind 22 on the winding shaft 31 in accordance with the movement of the pull rod 36 in the direction of the winding shaft 31. It remains under permanent tension for the entire duration of the movement.

[0053] The idle segment of the spring steel band 45 is pushed back into the chamber 57 through the slot formed by the partition 61 after it disengages from the outer circumferential surface 53. In this chamber, the spring steel band 45 is automatically rewound into a spiral 49 of increasing diameter. No drive is required for winding the spiral 49. The spring steel band is wound on the spiral 49 or into the spiral 49 due to the pre-formed shape of the spring steel band 45 that is configured similarly to a clockwork spring. If the spring steel band 45 of the drive arrangement 33 were to lie freely on a table, due to its pre-formed shape, it would automatically resume the spiral structure after being completely unwound.

[0054] Upon consideration of FIG. 3, a person skilled in the art could easily ascertain that the drive arrangements 32, 33 need not necessarily be arranged in the region of the bottom end of the respective guide rails 27 and 28. They could also be arranged on the far ends of the guide rails 27, 28 relative to the winding shaft 31. In this case, the spring steel band 45 would subject the pull rod 36 to tension rather than pressure in order to extract the roller blind 29. The most favorable arrangement depends on the respective space conditions within the car body.

[0055] In addition, the type of drive described in connection with the rear window is also suitable for use on a roof window blind.

[0056] One can also ascertain that the spring steel band 45 need not necessarily be arranged parallel to the plane of the roller blind with its flat sides as shown, but could also be arranged perpendicular thereto. In such a case, it is practical to utilize an undercut guide groove 34 as described further below.

[0057] The side window blind 25 also utilizes the above-described drive arrangement 33, but with a different guiding device. FIG. 4 shows a perspective representation of the side door 11, from which the inside trim panel 65 is partially removed. The side window blind 25 comprises a winding shaft 66 that is accommodated in the door and on which one edge of the roller blind 67 is fixed. The free end of the roller blind 67 is connected to a pull rod 68, the function of which corresponds to that of the pull rod 36 of the above-described embodiment. In contrast to the embodiment described above, the pull rod 68 is not guided by guide rails 27 or 28, but by a support rod 69. The support rod 69 consists of a straight rod that extends approximately perpendicularly to the lower edge of the window 14 and penetrates the interior of the door.

[0058] The support rod 69 is moved by a drive arrangement 33 of the type described above. A guide tube 71 that contains an undercut guide groove 72 as shown in FIG. 5 extends underneath the housing 55 of the drive arrangement 33. Another groove 73 that opens into the guide groove 72 and in which the support rod 69 is accommodated in sliding fashion with little play is arranged laterally adjacent to the guide groove 72. The guide groove 72 serves for guiding the spring steel band 45 without buckling.

[0059] Only the spring steel band 45 and the drive gear 52 of the drive arrangement 33 are shown in FIG. 5. The housing 55 with the chamber 57 and the spring band spiral 49 accommodated therein, which is illustrated in FIG. 3 and described in detail with reference thereto, is also provided in the drive arrangement 33 shown in FIG. 4, but is not illustrated in FIG. 5.

[0060] The working segment of the spring steel band 45 extends in the undercut groove 72, wherein the driving end 46 essentially is rigidly connected to the lower end of the support rod 69.

[0061] The function of this roller blind is as follows. When the roller blind is retracted, the pull rod 68 is located at the height of the lower window edge. The support rod 69 penetrates into the guide tube 71 as far as possible and therefore only protrudes over the upper edge of the housing 55 by a short distance. Thus, most of the working segment of the spring steel band 45 is located in the guide tube 71. As in the above-described embodiment, a small segment of the spiral 49 remains in the chamber 57.

[0062] If the side window must be shaded, the user actuates the corresponding drive motor 50 so that the working segment of the spring steel band 45 is extracted from the guide tube 71 due to the positive coupling between the spring steel band 45 and the driving gear 52. This results in the upward movement of the support rod 69 that is rigidly connected to the end 46 of the working segment, i.e., a movement in the direction of the upper edge of the window 14.

[0063] During this transport movement of the spring steel band 45, the idle segment is wound up into a spiral in the above-described fashion inside the housing 55, particularly in the chamber 47 provided therein. The spring steel band 45 is also spirally pre-formed in the embodiment shown in FIGS. 4 and 5 so that it has the tendency to assume the spiral configuration according to FIG. 3 if the spring steel band 45 is not subjected to any external influences.

[0064] The extraction of the spring steel band 45 from the guide tube 71 takes place until the pull rod 68 is positioned in the region of the upper window edge. In this position, the drive arrangement 33 is blocked, for example, because a limit stop on the spring steel band 45 or the pull rod 43 blocks the additional extraction movement of the support rod 69 from the guide tube 71.

[0065] In the illustrated embodiment, the drive arrangement 33 is positioned in the vicinity of the lower window edge, i.e., on the upper end of the guide tube 71. During the
extraction of the roller blind 67, the spring steel band 45 generates a tension force, wherein the working segment of the spring steel band 45 is subjected to pressure in order to retract the roller blind. The retraction takes place in the same manner in the opposite direction, with the spring steel band 45 being pushed into the guide channel 72. During this process, the spring steel band 45 moves the support rod 69 back into the guide tube 71.

In the embodiments illustrated in the figures, the wrap angle of the driving gear 52 is approximately 180°. One can easily ascertain that the wrap angle can be greatly reduced. It will be understood, for example, that the wrap angle can be reduced until only two projections 53 are simultaneously engaged with the spring steel band 45. Thus, the spring steel band 45 practically extends past the driving gear 52 tangentially and the wrap angle is almost zero. However, the spring steel band 45 is held in contact with the outer circumferential surface 53 of the driving gear 52 by suitable limit stops that are spaced apart from one another. Such a small number of simultaneously engaged projections 54 makes it possible to produce an overload protection if the projections 54 only have a relatively small height. If the flanks of the projections 54 in the form of a truncated cone or a spherical cap are also inclined, it is possible for the projections 54 to disengage from the holes 48 once the retention force for the spring steel band 45 exceeds a predetermined limit value. An effective anti-catching protection can be realized in this fashion with the aid of the new drive arrangement.

It should also be quite clear that the perforation need not be in the form of round holes on the longitudinal axis of the spring steel band. The perforation may also be in the form of edge perforations. In this case, one or both edges of the spring steel band are provided with rectangular open-edge notches.

A drive arrangement for roller blinds of motor vehicles is provided. The drive arrangement includes a housing that contains a chamber for accommodating a spring steel band that is pre-formed in a spiral shape in a similar manner to a clockwork spring. The spring steel band is equidistantly perforated in the longitudinal direction and moves over a drive gear that is configured similarly to a barbed wire and driven by a geared motor. The projections of the drive gear engage with the holes of the spring steel band.

A drive arrangement for a roller blind in a motor vehicle, the roller blind including an extendable and retractable roller blind, an edge of the roller blind that travels the greatest distance during the extraction or retraction of the roller blind being powered by the drive arrangement, the drive arrangement comprising:

1. A spring steel band having a longitudinal perforation of equidistantly distributed openings, the spring steel band being pre-formed in such a way that it forms a flat spiral spring having spring layers that are arranged adjacent to one another in an unstressed state, an inner end of the spring steel band defining a non-working end and an outer end of the spring steel band defining a driving end that operatively acts upon the roller blind;
2. A drive arrangement according to claim 1, wherein the spring layers lie directly on top of one another.
3. A drive arrangement according to claim 1, wherein the spring steel band is curved relative to the longitudinal axis.
4. A drive arrangement according to claim 1, wherein the drive arrangement is coupled to the roller blind in such a way that the spring steel band is subjected to tension during extraction of the roller blind.
5. A drive arrangement according to claim 1, wherein the drive arrangement includes a rope for coupling the drive end of the spring steel band with the roller blind.
6. A drive arrangement according to claim 1, wherein the guide rail includes an undercut guide groove and a flat side of the spring steel band points in the direction of the groove slot.
7. A drive arrangement according to claim 1, wherein the drive arrangement includes a housing on which the geared motor is mounted, the housing including the engagement mechanism that maintains the spring steel band and the drive gear in the engaged state.
8. A drive arrangement according to claim 1, wherein the engagement mechanism that maintains the spring steel band and the drive gear in the engaged state is configured in such a way that the projections disengage from the perforation of the spring steel band in the event of an overload.
9. A drive arrangement according to claim 1, wherein the projections are configured as spherical caps or cones.
10. A drive arrangement according to claim 1, wherein a height of the projections is 0.8-times to 1.5-times a thickness of the spring steel band.
11. Window blind wherein it features a drive arrangement according to claim 15.
A window blind for a motor vehicle comprising:

an extendable and retractable roller blind, being powered by the drive arrangement,
a drive arrangement for driving an edge of the roller blind that travels the greatest distance during the extraction or retraction of the roller blind, the drive arrangement including:

a spring steel band having a longitudinal perforation of equidistantly distributed openings, the spring steel band being pre-formed in such a way that it forms a flat spiral spring having spring layers that are arranged adjacent to one another in an unstressed state, an inner end of the spring steel band defining a
non-working end and an outer end of the spring steel band defining a driving end that operatively acts upon the roller blind;

a drive gear having an outer circumference that is provided with a plurality of projections configured to positively engage with the perforation of the spring steel band;

a geared motor having an output shaft that is rigidly coupled to the drive gear; and

an engagement mechanism that maintains the spring steel band and the drive gear in an engaged state.

17. A window blind according to claim 16, wherein the roller blind includes a pull rod.

18. A window blind according to claim 17, wherein an end of the pull rod is guided in a guide rail.

19. A window blind according to claim 17, wherein ends of the pull rod are guided in guide rails, and a drive arrangement is assigned to each guide rail.

20. A window blind according to claim 16, wherein a support rod is provided and a guide arrangement is assigned to the support rod and guides the support rod parallel to the extraction direction of the roller blind.

21. A window blind according to claim 20, wherein the support rod is elastically bendable.

22. A window blind according to claim 20, wherein a lower end of the support rod is coupled to the spring steel band.

23. A window blind according to claim 20, wherein the drive arrangement is arranged in the vicinity of a location in which a far end of the support rod relative to the pull rod is located in a retracted position.

24. A window blind according to claim 20, wherein the drive arrangement is arranged in the vicinity of a location in which a far end of the support rod relative to the pull rod is located in a retracted position.

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