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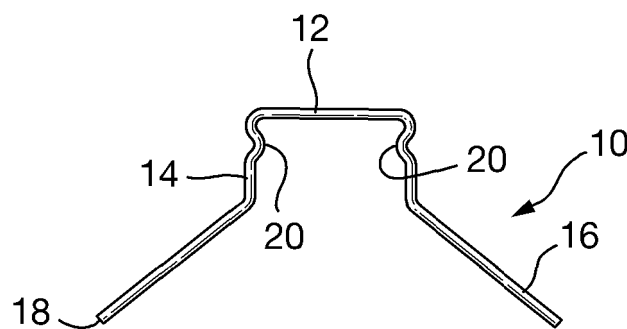
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**(54) Fixation of a cord spool support**

(57) A method of fixing a cord spool support (40) in a longitudinally-elongated head rail (30) or bottom rail of a window covering, so that the support holds an end of a longitudinally-extending cord spool (62) adjacent to a longitudinally-extending opening (39) in the rail. The support is provided with a longitudinally- and vertically-extending groove (46) in a top or bottom surface at a lateral

side. In the groove is seated a horizontally-extending base portion (12) of a generally planar, U-shaped metal wire spring (10), having two generally vertically-extending arm portions (14) attached to the base portion and two acutely-angled arm portions (16) which are attached to the vertically-extending arm portions, extend away from the base portion and terminate in ends (18) with sharp edges.

**Fig.1.**



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## Description

**[0001]** The invention relates to the fixation of a cord spool support in the head rail or bottom rail of a window covering which can be extended and retracted. The invention particularly relates to the fixation of a cord spool support in the head rail of a Roman shade.

**[0002]** A Roman shade typically has had a longitudinally-elongated head rail which holds two or more, longitudinally-extending cord spools above a longitudinally-extending bottom opening in the head rail. The cord spools have been adapted to wind and unwind lift cords to open and close the shade. In this regard, each lift cord has extended downwardly from a cord spool, through the bottom opening in the head rail, and has been attached to a bottom bar of the shade. A longitudinal end of each cord spool has been rotatably mounted in a support that is attached to an interior surface of the head rail. A rotatable longitudinally-elongated rod has extended axially through each cord spool, to support the spools and enable a user of the shade to rotate the spools with rotation of the rod in order to wind and unwind lift cords and thereby to raise and lower the shade. To hold each support securely on the end of a cord spool, the support has been held by a screw to a surface of the head rail. See, for example, US 5 996 667.

**[0003]** However, it has been difficult and costly to properly screw each support into the head rail so that the support properly holds the end of a cord spool, so that it can be rotated to wind and unwind a lift cord. Moreover, if the placement of a support in a head rail has not been properly done, relative to the end of the cord spool that it is to support, it has been difficult and costly to correct the problem.

**[0004]** Accordingly it is an object of this invention to provide a method of fixing a cord spool support in the head rail or bottom rail of a window covering, so that the support and its cord spool are securely held against horizontal or vertical movement, but nevertheless, their positions can be adjusted longitudinally to properly hold the spool adjacent a longitudinally-extending opening in the rail.

**[0005]** To this end, the invention provides a generally planar, U-shaped metal wire spring with a horizontally-extending base portion, two generally vertically-extending arm portions attached to the base portion, and two acutely-angled arm portions which are attached to the vertically-extending arm portions, extend away from the base portion and terminate in ends with sharp edges. The base portion of the spring is seated in a longitudinally- and vertically-extending groove in a top or bottom surface at a lateral side of the cord spool support with the two generally vertically-extending arm portions closely adjacent to longitudinally-opposite sides of the support. The vertical height of the spring is greater than the vertical height of the support and of the rail, so that the sharp edges of its two acutely-angled arm portions are biased against, and frictionally engage, a horizontal, bottom or

top, interior surface of the rail. Advantageously, the base portion of the spring is slidable vertically in the groove of the cord spool, so that the base portion is also biased against, and frictionally engages, the opposite horizontal interior surface of the rail. It is especially advantageous that the shade is a Roman shade and the rail is a head rail. It is particularly advantageous that the horizontal interior surface of the head rail, engaged by the pointed ends of the spring, is its bottom interior surface and the vertically-extending portions and the acutely-angled portions of the spring extend downwardly from the horizontally-extending portion of the spring. In this regard, it is also particularly advantageous that the horizontal interior surface of the head rail, engaged by the base portion of the spring, is its top interior surface. Also advantageously, the spring is a spring steel, and its ends terminate in sharp circular edges.

**[0006]** Further advantageous aspects of the invention will become clear from the following description of a preferred embodiment and from the claims. The invention will now be described in reference to the accompanying drawings, in which:

- Figure 1 is a front view of the U-shaped spring of the invention, showing it extending longitudinally and upwardly;
- Figure 2 is a side view of the U-shaped spring of Figure 1 from a longitudinal end;
- Figure 3 is a front view of a cord spool support holding one longitudinal end of a longitudinally-extending cord spool and the horizontally-extending portion of the U-shaped spring of Figure 1;
- Figure 4 is a laterally-extending sectional view of the cord spool support shown in Figure 3;
- Figure 5 is a perspective view of a head rail of a Roman shade in which are the spring and cord spool support of Figure 3 and the support holding one end of the cord spool of Figure 3;
- Figure 6 is a perspective view of the head rail of Figure 5, with the ends of the spring biased against the bottom surface of the head rail about its longitudinally-extending opening; and
- Figure 7 is a longitudinally-extending sectional view of the head rail of Figure 6, showing a lift cord wound about the cord spool and extending downwardly from the cord spool through the head rail's longitudinally-extending bottom opening.

**[0007]** Figs. 1 and 2 show a generally planar, U-shaped metal wire spring, generally 10, of this invention. The spring has a horizontally-extending base portion 12, two generally vertically-extending arm portions 14 attached to the horizontally-extending base portion 12, and two acutely-angled arm portions 16 which are attached to the vertically-extending arm portions 14, extend away from the horizontally extending base portion 12 and terminate in ends 18 with sharp edges. Both of the spring's vertically-extending arm portions 14 also preferably have

inwardly-bent curved portions 20. The spring 10 can be made of conventional spring steel wire, preferably having a round cross-section with a diameter in the range of 0.6 - 1.5 mm. The spring ends 18 are preferably cut perpendicular to the axis of the spring wire, so that the circular edges of the ends are sharp.

**[0008]** As discussed below and shown in Figures 5-7, the spring 10 is adapted to be used in a longitudinally-elongated, metal or plastic, preferably aluminum, head rail, generally 30, of a Roman shade (not shown). In use, the spring's horizontally-extending base portion 12 will preferably extend longitudinally, and the spring's vertically-extending arm portions 14 and acutely-angled arm portions 16 will preferably extend downwardly.

**[0009]** Figures 3 and 4 show a cord spool support, generally 40 which can be used with the spring 10 in the head rail 30. The top 42 of the support 40, adjacent a lateral side 44, has a downwardly- and longitudinally-extending groove 46. In use, the spring's horizontally-extending base portion 12 is seated in the groove 46 of the support 40. Preferably, the depth of the groove 46 is only slightly greater than the diameter of the base portion 12 of the spring 10. It is also preferred that the spring's base portion 12 can slide vertically in the support's groove 46.

**[0010]** As shown in Figures 5-7, the cord spool support 40 can be slid through the open longitudinal ends 32, 34 of the head rail 30 to fit snugly within the head rail with the top and bottom 42, 48 of the support closely adjacent to the horizontal, top and bottom, interior surfaces 36, 38, respectively, of the head rail. When the support 40 is inserted within the head rail, the groove 46 of the support can hold the horizontally-extending base portion 12 of the spring 10 with its vertically-extending arm portions 14 and acutely-angled arm portions 16 extending downwardly and its ends 18 in contact with, and bearing forcibly against, the bottom interior surface 38 of the head rail. The inwardly-bent curved portions 20 of the spring are adjacent to longitudinally-opposite sides 50, 52 of the support 40. The inwardly-bent curved portions 20 of the spring's vertically-extending arm portions 14 preferably are separated longitudinally by a distance equal to the longitudinal distance between the opposite sides 50, 52 of the support 40. Thereby, the inwardly-bent curved portions 20 of the spring 10 can hold the support 40 against longitudinal movement between the spring's vertically-extending arm portions 14 within the head rail 30.

**[0011]** The height of the spring 10, when relaxed, is significantly greater than the height of the cord spool support 40 and the interior of the head rail 30. Preferably, the vertical height of the spring is at least 6-15% greater than the vertical height of the interior of the head rail. As a result, when the cord spool support 40, holding the spring 10, is fit closely within the head rail 30, the spring ends 18 will be biased downwardly against the bottom interior surface 38 of the head rail, and the spring base portion 12 will be biased upwardly against the top interior surface 36 of the head rail. As a result, the spring ends 18 and the spring base portion 12 will frictionally engage

the head rail's bottom and top, interior surfaces 38, 36. In particular, the sharp circular edges of the ends 18 of the spring's acutely-angled arm portions 16 will grip tightly the head rail's bottom interior surface 38 to prevent the cord spool support 40 from moving significantly in a longitudinal direction within the head rail but will allow some adjustment of the longitudinal position of the support relative to an adjacent longitudinal end 60 of a cord spool 62.

**[0012]** Figure 7 shows the use of the cord spool support 40, holding the spring 10 of the invention, in the head rail 30 of a Roman shade. The support 40 holds, in a conventional manner, a longitudinal end 60 of a longitudinally-extending cord spool 62, so that the spool can be rotated by a user-operated, longitudinally-elongated rotatable rod (not shown), extending axially through the spool. Rotation of the spool 62 can be used to wind up and unwind a vertically-extending lift cord 64 that is attached to the spool and extends downwardly from the spool through a longitudinally-extending opening 39 in the bottom of the head rail.

**[0013]** However, the head rail 30 of an actual Roman shade would typically have at least two lift cords (not shown in Figure 7), each being attached to its own cord spool 62. A longitudinal end 60 of each spool 62 would be supported by a support 40, holding its own spring 10. Each lift cord 64 would extend downwardly from its spool 62 through the opening 39 in the bottom of the head rail.

**[0014]** It is thus believed that the operation and construction of the present invention will be apparent from the foregoing description. To one skilled in this art, it will be clear that the invention is not limited to the embodiment described herein. Also kinematic inversions are considered inherently disclosed and to be within the scope of the invention. Further, expressions such as: "horizontal", "vertical", "top", "bottom", "longitudinal" and "lateral" should be construed as relative terms which include equivalents for the structures disclosed. The use of expressions such as "preferred", "advantageously" etc. is also not intended to limit the invention.

## Claims

1. A method of fixing a cord spool support in a longitudinally-elongated head rail or bottom rail of a window covering, so that the support holds an end of a longitudinally-extending cord spool adjacent to a longitudinally-extending opening in the rail, **characterized in that:**

- the support is provided with a longitudinally- and vertically-extending groove in a top or bottom surface at a lateral side; and in the groove is seated a horizontally-extending base portion of a generally planar, U-shaped metal wire spring, having two generally vertically-extending arm portions attached to the base portion and two acutely-angled arm portions which are

attached to the vertically-extending arm portions, extend away from the base portion and terminate in ends with sharp edges.

2. The method of claim 1 wherein the two generally vertically-extending arm portions are closely adjacent to longitudinally-opposite sides of the support. 5
3. The method of claim 1 or 2 wherein the vertical height of the spring is greater than the vertical height of the support and of the rail, so that the sharp edges of its two acutely-angled arm portions are biased against, and frictionally engage, a horizontal, bottom or top, interior surface of the rail. 10
4. The method of claim 3 wherein the base portion of the spring is slidable vertically in the groove of the support, so that the base portion is biased against, and frictionally engages, a horizontal, top or bottom, interior surface of the rail. 15
5. The method of any one of claims 1-4 wherein the spring is a spring steel and its ends terminate in sharp circular edges. 20
6. The method of any one of claims 3-5 wherein the vertical height of the spring is at least 6-15% greater than the height of the interior of the head rail. 25
7. The method of any one of claims 1-6 wherein the shade is a Roman shade, the rail is a head rail and there are two or more cord spool supports, each holding a longitudinal end of one of a plurality of longitudinally-extending cord spools adjacent the opening in the rail; each support having a longitudinally- and vertically-extending groove in a top or bottom surface at a lateral side, and in each groove is seated a horizontally-extending base portion of a generally planar, U-shaped metal wire spring having two generally vertically-extending arm portions attached to the base portion and two acutely-angled arm portions which are attached to the vertically-extending arm portions, extend away from the base portion and terminate in ends with sharp edges. 30  
35  
40
8. The method of claim 7 wherein the horizontal interior surface of the head rail, engaged by the pointed ends of the spring, is its bottom interior surface and the vertically-extending portions and the acutely-angled portions of the spring extend downwardly from the horizontally-extending portion of the spring. 45  
50
9. A Roman shade **characterized in** having a cord spool support, cord spool and U-shaped metal wire spring of any one of claims 1-8. 55
10. The Roman shade of claim 9 wherein the support is provided with a longitudinally- and vertically-extend-

ing groove in a top or bottom surface at a lateral side; and in the groove is seated a horizontally-extending base portion of a generally planar, U-shaped metal wire spring, having two generally vertically-extending arm portions attached to the base portion and two acutely-angled arm portions which are attached to the vertically-extending arm portions, extend away from the base portion and terminate in ends with sharp edges.

Fig.1.

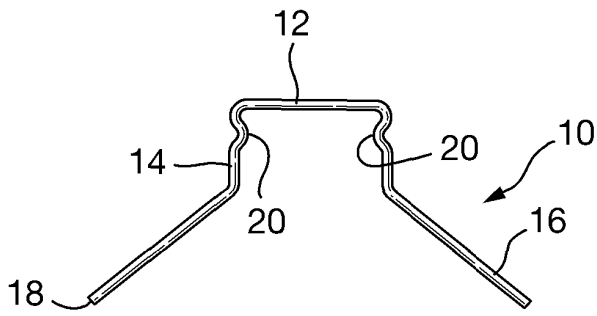


Fig.2.

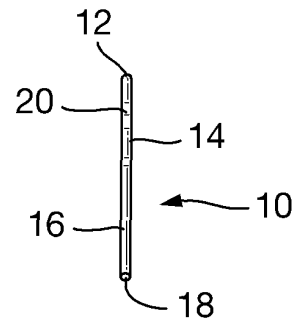


Fig.3.

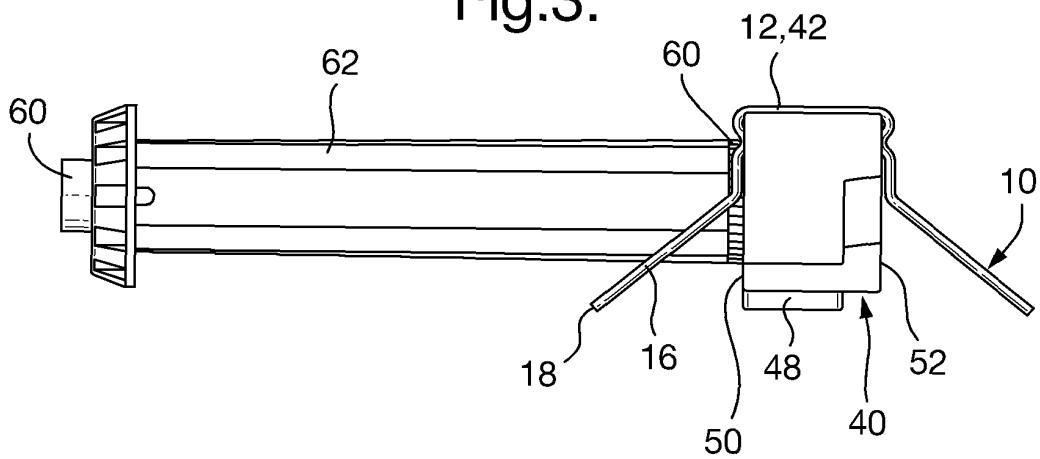


Fig.4.

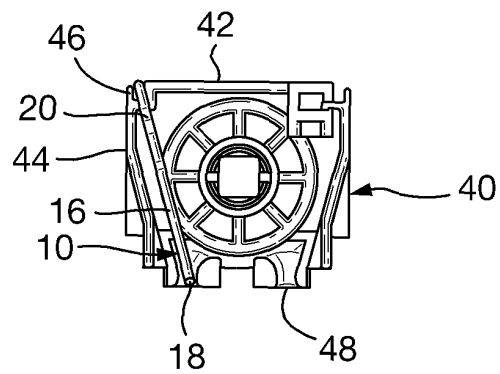


Fig.5.

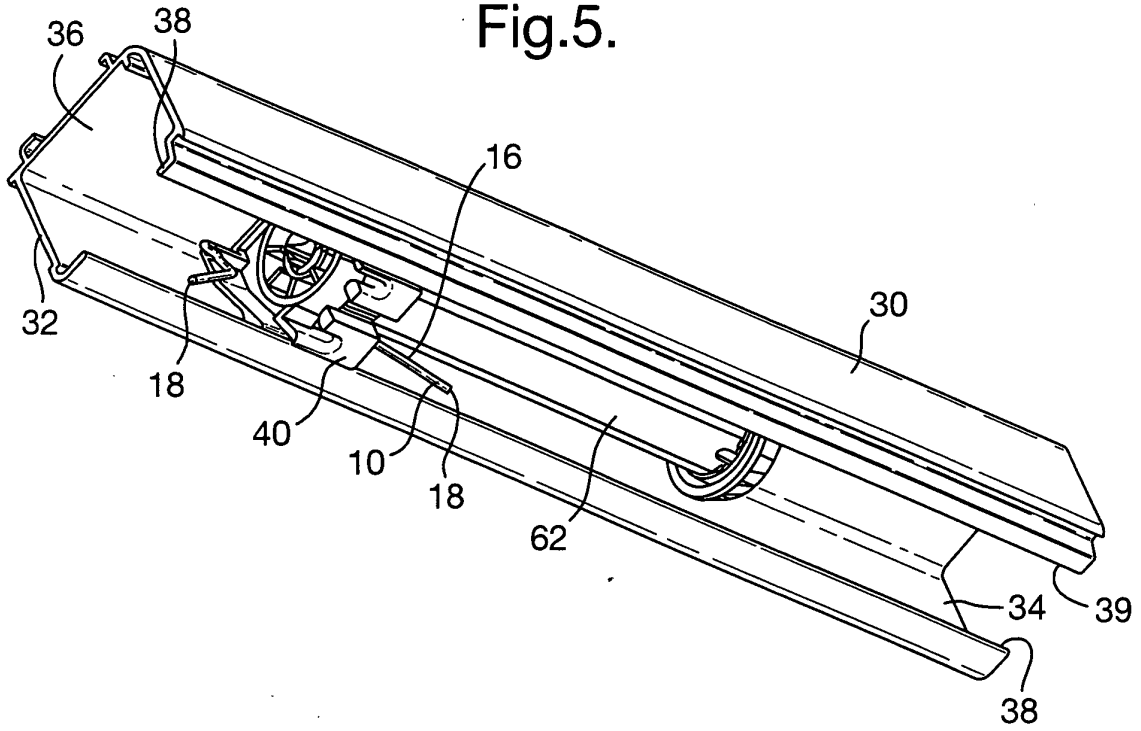


Fig.6.

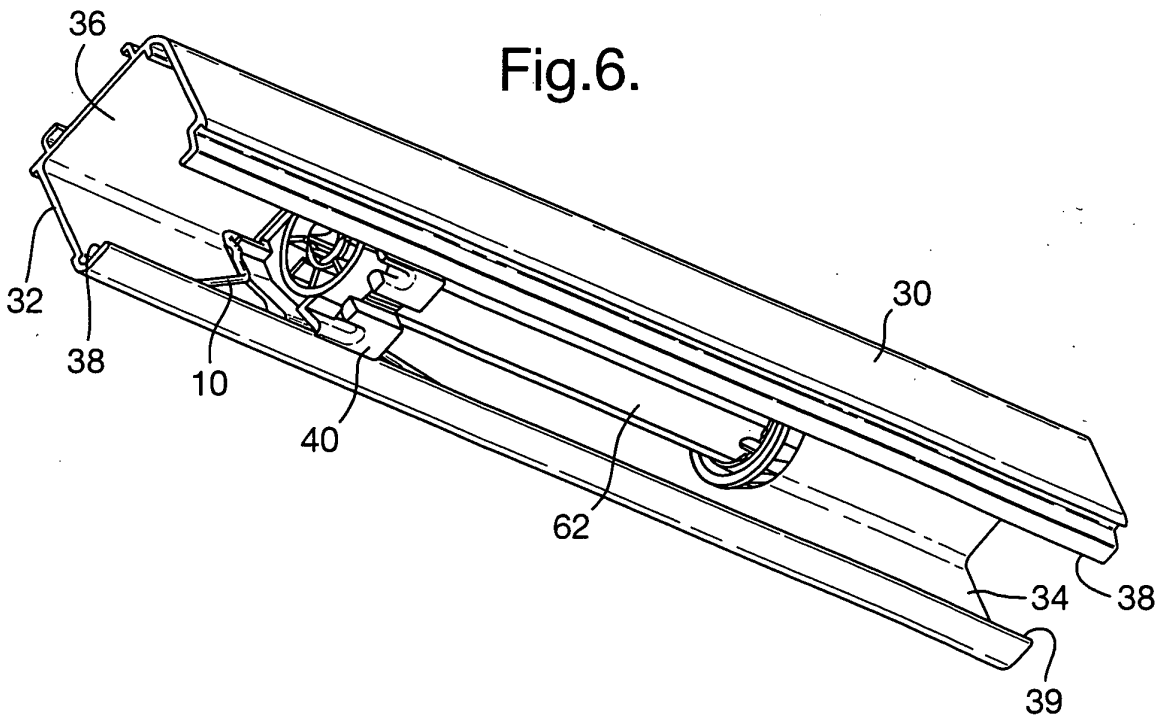
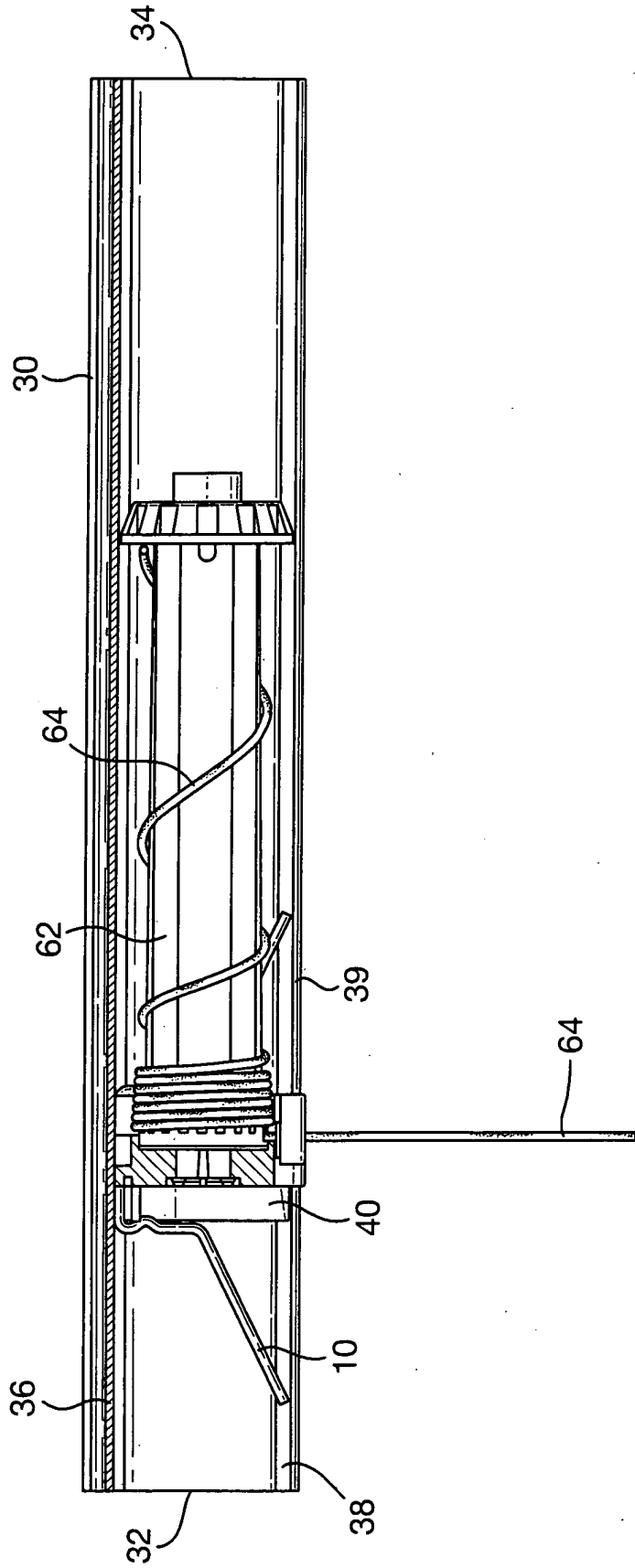


Fig.7.



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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