

Sept. 24, 1963

D. POLSKY

3,104,700

MAGNETICALLY RETAINED WINDOW SHADE ROLLER

Filed Dec. 3, 1962

2 Sheets-Sheet 1

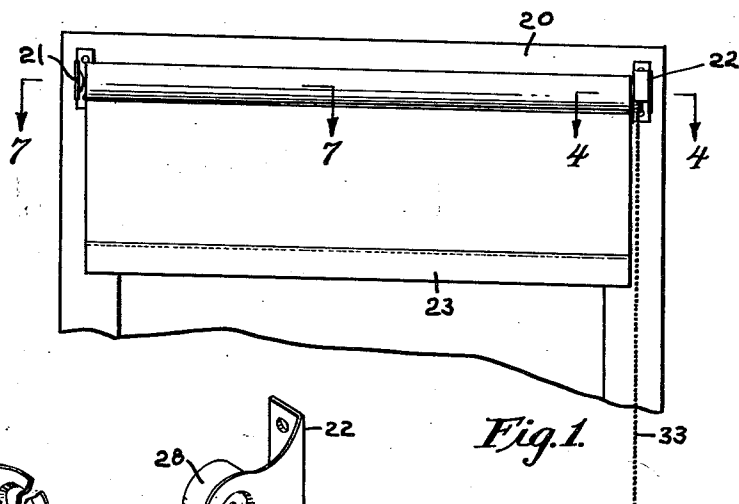


Fig. 1.

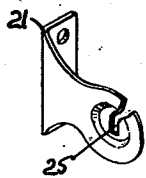


Fig. 2.

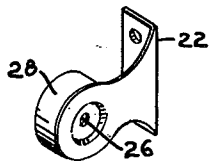


Fig. 3.

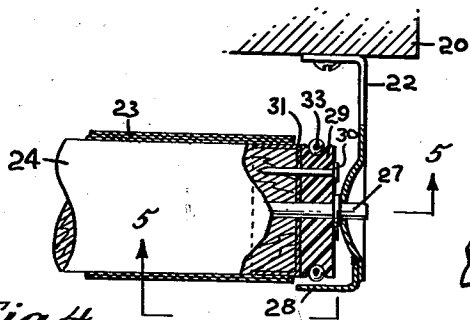


Fig. 4.

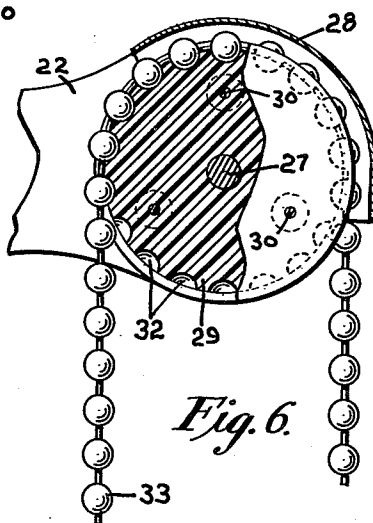


Fig. 6.

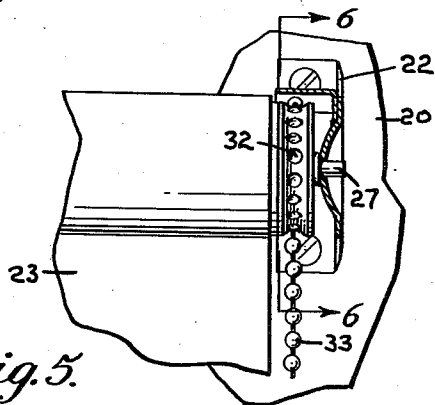


Fig. 5.

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MAGNETICALLY RETAINED WINDOW SHADE ROLLER

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2 Sheets-Sheet 2

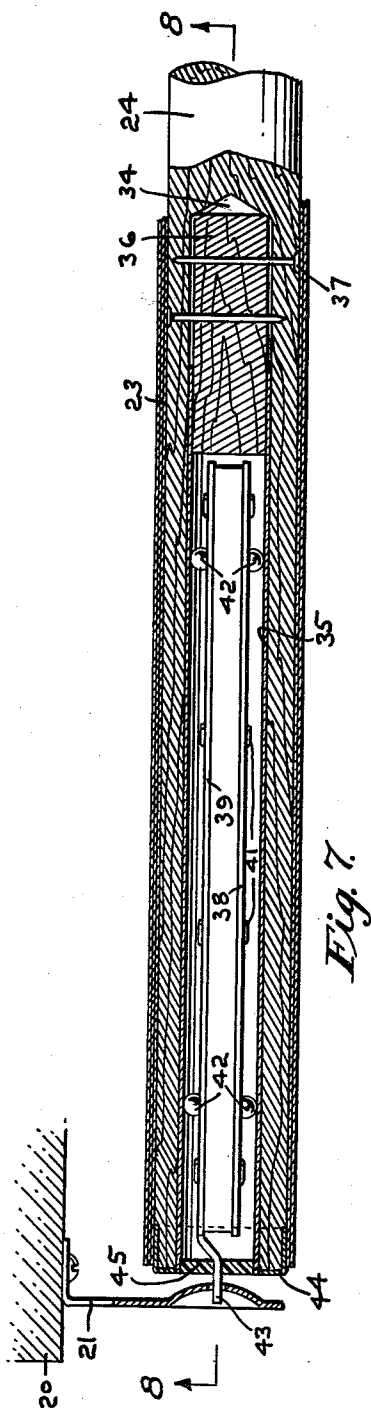


Fig. 7

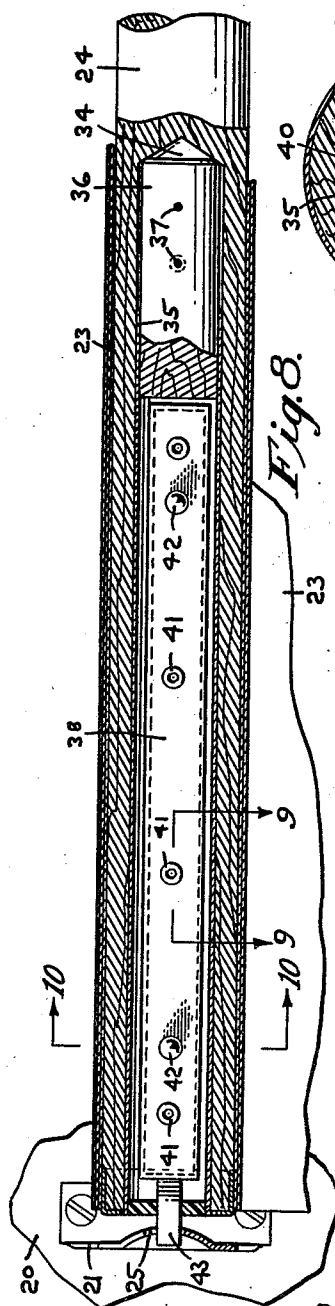


Fig. 8

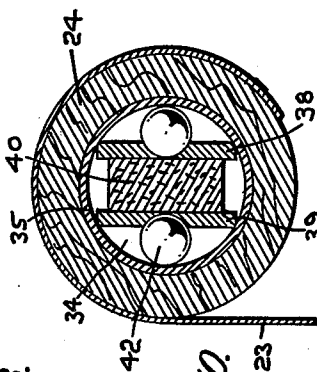


Fig. 10

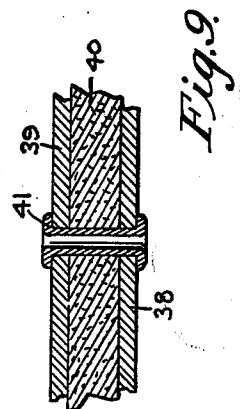


Fig. 9

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3,104,700

MAGNETICALLY RETAINED WINDOW SHADE ROLLER

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14 Claims. (Cl. 160—298)

This invention relates generally to window shades of the springless roller type, and more particularly relates to a construction of window shade roller which holds the shade carried thereby in the desired adjusted position without any possibility of suddenly permitting the window shade to spontaneously snap upward and wind about the roller.

From external appearances, the window shade roller according to the invention is similar to the ordinary spring type of window shade roller, and in fact can be installed for operation with the same support brackets used with the spring type of roller. The external appearance of the roller according to the invention is substantially the same as the spring type of window shade roller because the position retaining part of the roller structure is disposed within the roller at one end thereof and is thus concealed from view. Basically, the roller according to the invention is one wherein the usual spring structure is replaced by a fixed position metal sleeve fixedly secured to the roller and within which is disposed a rotary structure free to turn relative to the roller itself except as restrained by a magnetic force operative between the rotary portion and the metal sleeve in a manner which will be made subsequently clear. Accordingly, it is a primary object of this invention to provide a novel window shade roller of the springless type which may be directly substituted for a window shade having a spring type roller without changing even the bracket support structures.

Another object of this invention is to provide a novel springless window shade roller in which the position of the roller is maintained by means of a magnetic assembly disposed within and concealed by one end of the conventional shade roller.

Still another object of this invention is to provide a novel springless window shade roller as aforesaid in which the magnetic roller position holding assembly includes a part fixedly secured to and rotatable with the shade roller and another part magnetically secured thereto and relatively rotatable with respect to the shade roller.

The foregoing and other objects of the invention will become clear from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIGURE 1 is an elevational view of a window shade mounted to a shade roller according to the invention and installed for operation to a window frame;

FIGURE 2 is an enlarged perspective view of the left end shade roller supporting bracket of FIGURE 1;

FIGURE 3 is an enlarged perspective view of the right end shade roller supporting bracket of FIGURE 1;

FIGURE 4 is an enlarged horizontal cross-sectional view through the right end of the structure of FIGURE 1 as would be seen when viewed along the line 4—4 thereof;

FIGURE 5 is a view partly in elevation and partly in section of the structure of FIGURE 4 as would be seen when viewed along the line 5—5 of that figure;

FIGURE 6 is a fragmentary enlarged vertical sectional view through the shade roller at the righthand end thereof as would be seen when viewed along the line 6—6 of FIGURE 5;

FIGURE 7 is an enlarged horizontal cross-sectional view through the lefthand end of the shade roller structure illustrating the springless roller position holder disposed within the end of the roller, as would be seen when viewed along line 7—7 of FIGURE 1;

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FIGURE 8 is a horizontal sectional view through the structure of FIGURE 7 taken at right angles to the showing of FIGURE 7 as would be seen when viewed along the line 8—8 thereof;

FIGURE 9 is an enlarged fragmentary cross-sectional view through a portion of the magnetic structure of the roller position retaining device as would be seen when viewed along the line 9—9 of FIGURE 8;

FIGURE 10 is an enlarged cross-sectional view through the shade and roller structure as would be seen when viewed along the line 10—10 of FIGURE 8.

In the several figures, like elements are denoted by like reference characters.

Referring now to the figures and firstly, principally to FIGURES 1 through 6, there will be seen a window frame 20 to opposite sides of which are affixed left and right end brackets 21 and 22 respectively which physically support the shade 23 secured upon roller 24 in a conventional manner. From FIGURES 2 and 3 it will be observed that the end brackets are of the conventional type, the bracket 21 including the slot 25 adapted to receive the conventional flattened end projection usually associated with the spring type shade roller while the right end bracket 22 is provided with the central circular hole 26 adapted to receive the standard circular end pin of the type designated 27 and best seen in FIGURES 4 and 5. The bracket 22 is also provided with a hood 28 extending inward over the sprocket wheel 29 secured to the righthand end of the roller 24 by means of the pin 27 and nails 30 driven endwise into the roller through the metal end cap 31. The sprocket wheel 29 is provided about its periphery with regularly spaced ball sockets 32 which receive the balls of a ball chain 33. The shade 23 is rolled up and unrolled by rotation of the roller effected through the medium of the sprocket wheel 29 affixed thereto when the ball chain 33 is drawn downward to produce a clockwise or counterclockwise rotation of roller 24, which latter is supported on its end pin 27 rotatably seated in the end bracket 22 through the circular hole 26. The hood 28 of the bracket 22 prevents the inadvertent and undesired disengagement of ball chain 33 from sprocket wheel 29.

Referring now to FIGURES 7 through 10 it is observed that the lefthand end of roller 24 has been axially drilled to provide a cylindrical bore 34 within which is close-fittingly disposed a cylindrical sleeve 35. Wedged for a distance in the righthand end of the sleeve 35 is a wooden plug 36 secured fixedly in position by means of the nails 37 driven commonly through the roller 34 and the plug 36 in the manner best seen in the showing of FIGURE 7. Since the plug 36 is wedge-fitted into the cylindrical sleeve 35 it will be understood that the sleeve 35 is fixedly secured to the roller 24 and is constrained to rotate therewith.

Rotatably close-fittingly disposed within the cylindrical sleeve 35 is a magnetic assembly including a pair of parallel spaced-apart metal plates 38 and 39 disposed in flat surface engagement with the opposite pole faces of a magnet 40 so that each of the plates 38 and 39 functions as a pole piece, the sandwich arrangement being held securely together by means of the rivets 41. The pole piece plates 38 and 39 are also each provided with a pair of depressions within which are disposed ball bearings 42 which maintain the riveted magnet structure in properly centered position within the cylindrical sleeve 35 and prevent jamming or wedging of the magnetic structure when it is rotated relatively to the cylindrical sleeve 35. As best seen in FIGURES 7 and 8, the end of the pole piece plate 39 proximate the end of roller 24 is provided with an axially extending offset tab 43 of flat form which extends outwardly endwise of the roller end for locking disposition within slot 25 of the left end

bracket 21. The roller assembly is completed by the end cap 44 and the closure disc 45 through which latter is extended the tab 43.

The cylindrical sleeve 35 and pole pieces 38 and 39 are made of magnetically susceptible material so that in the assembly as best seen in FIGURE 10 it is clear that the pole pieces 38 and 39 are strongly magnetically attracted into engagement with the cylindrical sleeve 35. As shown in FIGURE 10, the metal plates 38 and 39 are of such width that opposite side edges both engage the inside surface of the sleeve 35 and thus set up a frictional resistance to relative rotation between the sleeve 35 and the magnetic structure. Since the axially extending tab 43 is non-rotatably held by virtue of its fixed position within the slot 25 of bracket 21 it should be now understood that the roller 24 can only be caused to rotate by overcoming the frictional engagement between the magnetic structure and the inside of the sleeve 35 which latter is fixedly secured to the roller. This frictional restraint is overcome by exerting the proper amount of pull upon the ball chain 33 trained about the sprocket wheel 29 at the opposite end of the roller 24. The amount of frictional restraint that is desired will of course vary with the size and weight of the shade. In a specific case increased frictional engagement may be provided by increasing the area of contact between the pole plate pieces 38 and 39 and cylindrical sleeves 35, as for example by utilizing a longer magnet structure. Decreased frictional resistance is obtainable by using a shorter magnet structure or reducing the width of a pole piece plate 38 and/or 39 so that one side edge does not contact the inside of the sleeve 35.

While the magnet bar 40 may be made of any suitable magnetic material it has been found that the so-called magnetic rubber compositions are very satisfactory since they are easily cut and machined and retain their magnetic properties to a substantial degree when being so handled due to the generally resilient nature thereof which minimizes the shock effect for example associated with the riveting operation and which has a demagnetizing effect.

Having now described my invention in connection with a particularly illustrated embodiment thereof it will be appreciated that variations and modifications of the same may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of my invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed as new and useful is:

1. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally apertured for a distance inward from one end thereof, a sleeve of magnetically susceptible material disposed coaxially close-fittingly non-rotatably within the apertured end of said roller member, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

2. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an

elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally apertured for a distance inward from one end thereof, a sleeve of magnetically susceptible material disposed coaxially close-fittingly non-rotatably within the apertured end of said roller member, a magnet structure disposed rotatably within said sleeve with at least one surface there physically touching the inside surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, centering means disposed between said magnet structure and the inside of said sleeve effective to maintain said magnet structure in predetermined coaxial orientation relatively to said sleeve to prevent jamming action therebetween when the magnet structure and sleeve rotate relatively to one another, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

3. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated cylindrical roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally cylindrically apertured for a distance inward from one end thereof, a cylindrical sleeve of magnetically susceptible material disposed coaxially close-fittingly non-rotatably within the apertured end of said roller member, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside cylindrical surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, centering means disposed between said magnet structure and the inside of said sleeve effective to maintain said magnet structure in predetermined coaxial orientation relatively to said sleeve to prevent jamming action therebetween when the magnet structure and sleeve rotate relatively to one another, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

4. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated cylindrical roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally cylindrically apertured for a distance inward from one end thereof, a cylindrical sleeve of magnetically susceptible material disposed coaxially close-fittingly within the apertured end of said roller member, means fixedly securing said sleeve to said roller effective to prevent relative rotation therebetween, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside cylindrical surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, means secured to the opposite end of said roller member for rotatably supporting

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the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

5. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally apertured for a distance inward from one end thereof, a sleeve of magnetically susceptible material disposed coaxially close-fittingly non-rotatably within the apertured end of said roller member, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, said magnet structure taking the form of a three layer secured sandwich in which the center layer is a permanent magnet and the outer layers are flat plate pole pieces, said permanent magnet center layer being of narrower width than the pole pieces and spaced out of direct contact with the said sleeve, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

6. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally apertured for a distance inward from one end thereof, a sleeve of magnetically susceptible material disposed coaxially close-fittingly non-rotatably within the apertured end of said roller member, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, said magnet structure taking the form of a three layer secured sandwich in which the center layer is a permanent magnet and the outer layers are flat plate pole pieces, said permanent magnet center layer being of narrower width than the pole pieces and spaced out of direct contact with the said sleeve, low friction centering means disposed between each of said flat plate pole pieces and the inside of said sleeve effective to maintain said magnet structure centered within said sleeve and prevent jamming action therebetween when the magnet structure and sleeve rotate relatively to one another, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

7. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated cylindrical roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being centrally cylindrically apertured for a dis-

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tance inward from one end thereof, a cylindrical sleeve of magnetically susceptible material disposed coaxially close-fittingly within the apertured end of said roller member, means fixedly securing said sleeve to said roller effective to prevent relative rotation therebetween, a magnet structure disposed rotatably within said sleeve with at least one surface thereof physically touching the inside cylindrical surface of said sleeve and carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, said magnet structure taking the form of a three layer secured sandwich in which the center layer is a permanent magnet and the outer layers are flat plate pole pieces, said permanent magnet center layer being of narrower width than the pole pieces and spaced out of direct contact with the said sleeve, low friction centering means disposed between each of said flat plate pole pieces and the inside of said sleeve effective to maintain said magnet structure centered within said sleeve and prevent jamming action therebetween when the magnet structure and sleeve rotate relatively to one another, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said sleeve and said magnet structure.

8. The shade roller structure as set forth in claim 7 wherein said low friction centering means are ball bearings, and said pole pieces are provided with depressions within which said ball bearings are rotatably partly disposed.

9. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a piece of magnetically susceptible material disposed within the apertured end of said roller member and fixedly secured to the roller for rotation therewith, a magnet structure disposed rotatably within the apertured end of said roller member with one surface thereof physically engaged with said piece of magnetically susceptible material, said magnet structure carrying a part projecting endwise axially out of and beyond the end of said roller member adapted for non-rotational engagement with a roller support bracket, means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket, and means carried by said roller operable for reversibly rotating the same relative to said magnet structure when the latter is non-rotatably held by overcoming the frictional restraint due to the magnetically established physical engagement between the said magnet structure and piece of magnetically susceptible material.

10. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a cylinder of magnetically susceptible material and a magnet structure disposed within the apertured end of said roller member with said magnet structure physically engaged with said cylinder and with the cylinder oriented coaxially with said roller, one of said magnet structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said magnet structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and

beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

11. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a cylinder of magnetically susceptible material and a magnet structure disposed within the apertured end of said roller member with said magnet structure physically engaged with said cylinder and with the cylinder oriented coaxially with said roller, said magnet structure being in the form of a three layer sandwich in which the center layer is a permanent magnet and the outer layers are magnetically susceptible pole pieces physically engaged with said cylinder of magnetically susceptible material, one of said magnet structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said magnet structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

12. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a hollow cylinder of magnetically susceptible material and a magnet structure disposed within the apertured end of said roller member with said magnet structure physically engaged with said cylinder and with the cylinder oriented coaxially with said roller, one of said magnet structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said magnet structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

13. A magnetically rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a hollow cylinder of magnetically susceptible material and a magnet structure disposed within the apertured end of said roller member with said magnet structure physically engaged with said cylinder and with the cylinder oriented coaxially with said roller, said magnet structure being in the form of a three layer sandwich in which the center layer is a permanent magnet and the outer layers are magnetically susceptible pole pieces physically engaged with said cylinder of magnetically susceptible material, one of said magnet structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said magnet structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

gated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a hollow cylinder of magnetically susceptible material and a magnet structure disposed within the apertured end of said roller member with said magnet structure physically engaged with said cylinder and with the cylinder oriented coaxially with said roller, said magnet structure being in the form of a three layer sandwich in which the center layer is a permanent magnet and the outer layers are magnetically susceptible pole pieces physically engaged with said cylinder of magnetically susceptible material, one of said magnet structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said magnet structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

14. A frictionally rotationally restrained springless shade roller structure, comprising in combination, an elongated roller member of substantially constant outer diameter adapted to have a flexible shade secured to the outer surface thereof for winding thereabout as the roller is rotated about its long axis, said roller member being axially apertured for a distance inward from one end thereof, a cylinder and an elongated structure disposed within the apertured end of said roller member with said elongated structure frictionally surface engaged with said cylinder and with the cylinder oriented coaxially with said roller, one of said elongated structure and cylinder being fixedly secured to the roller for rotation therewith, the other of said elongated structure and cylinder being rotatable relative to said roller and carrying a part projecting endwise axially out of and beyond the end of said roller member and being adapted for non-rotational engagement with a roller support bracket, and means secured to the opposite end of said roller member for rotatably supporting the roller from another support bracket.

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