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(54) Adjustable window shade.

(57) This invention is directed to a roll window shade whose overall length can be decreased, without cutting instruments, to conform it to the size of the window opening into which the shade is to be mounted. The window shade comprises a non-telescoping roller assembly (10) including a first tubular section (12) having an open end into which is fitted a second section (14) formed of a number of discrete roller segments (16) detachably connected end-to-end one to another. The outer diameters of the two tubular sections are the same such that the roller assembly has a substantially uniform outer diameter or smooth outer roller surface (17) from end-to-end. A shade (28) having a series of spaced, hand-strip lines (48) extending parallel to the shade edges (47) and forming discrete widths of shade material therebetween is attached to the roller assembly (10) such that the hand strip lines of the shade are substantially coincident with the discrete segments (16) of the second tubular section. The strip lines (48) permit hand-stripping of the discrete widths of the shade material while the shade (28) is rolled on the roller assembly to conform the width of the shade material to the width of the window opening. On hand-stripping of the excess shade material, one or more of the roller segments (16) are exposed. The exposed segments (16) are detached from the roller assembly (10) to conventiently shorten the length of the roller to conform it to the width of the shade material and to the window opening.

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Title: Adjustable Window Shade

This invention relates to roll window shades and, more particularly, to a window shade having a non-telescoping roller assembly of substantially uniform outside diameter from end-to-end, the shade material and roller assembly being sizable by hand without the use of cutting instruments to fit the window shade to a given size window opening.

The number of sizes of window openings into which window shades must be fitted is practically limitless. Practically all shades are in the range of 25 to 72 inches (63.5 to 183 cm) in roller length but there are window openings for every dimension within that range, and in older houses, window openings are frequently less than 25 inches (63.5 cm) wide. In the application of shades to windows, the shades must conform to the window size rather than the window size conforming to the available size of shades manufactured. This is true not only for newly constructed buildings, but obviously also for those buildings which were erected many years ago. For these reasons, when a customer wants a shade, it is common practice to select an oversized shade and to reduce the width of the shade material and the length of the roller to which the shade is attached to conform the window shade to the size of the window opening in which it is to be mounted.

In the mid-1960's, the Applicants introduced to the market roller assemblies which could be reduced in length to conform to a given size window opening without the need for cutting through the roller. These window shades provided improvements over prior art shades and methods of sizing, and are disclosed in United States

Patent Nos. 3,203,468; 3,299,944; and 3,580,323. These shades comprise two sections, one being telescopable in the other for supporting the shade material so that the sizing of the shade can be effected merely by cutting the shade material and the slat running through the lower edge, sliding the cut material from the roller, and telescoping the projecting portion of the roller into its adjoining section. The shade and roller combination is such that the upper edge of the shade material is secured to the roller along its entire length while at the same time permitting one of the roller sections to telescope into the other. In one form of window shade, the roller includes a tube of paper or other easily cuttable material interposed between the smaller section of the roller and the shade material, the shade material being attached to the larger roller section and to the interposed tube. This interrelationship of roller sections and shade material provides the full support for the upper edge of the shade while permitting the smaller roller section to telescope into the larger one. The attachment of the shade to both the larger roller section and the tube fixes the tube against rotation with respect to the larger roller section. On the other hand, the fixed tube with the shade material attached prevents the shade material from drooping along the side depending from the smaller section; and, when it is cut, the tube can be slid from the roller.

Shade material which can be incrementally sized to width by hand without the use of cutting instruments became available in the marketplace in the early 1970's and others have taken the obvious expedient of attaching such hand-strippable shade material to a telescoping roller such that the shade material is initially attached to the larger roller section with a contact

adhesive concealed between a strip of paper being provided on the smaller roller section for eventual securing of the unattached shade portion to the smaller roller. In known shades of this type, the shade is sized by completely unrolling the shade to expose the roller, holding the shade and the roller up to the window and adjusting the telescoping roller to fit the window brackets. The roller and shade material is thereafter removed from the roller brackets and the excess shade material removed by then grasping the shade at a slit in the edge of the shade material adjacent the roller. After the excess shade material is removed by pulling down along a strip line coinciding with the slit, the protective paper strip on the projecting end of the smaller roller is then removed and the unattached portion of the shade material is pressed down on the adhesive. The shade must now be manually rolled up. Although this type of shade permits sizing without the use of cutting tools, it requires a relatively large number of steps and is characterized by several distinct disadvantages. That is, in order for the shade to be sized, the shade material must be completely unrolled with the excess shade material being removed by stripping from the roller end of the shade toward the hem end. The shade must then be manually attached to the smaller end of the roller and then manually wound on the roller. One of the primary disadvantages, however, is that in shades of this type there is a discontinuity or step where the two roller sections are joined, and the shade has a tendency to droop over the larger roller onto the smaller roller making the shade unattractive in appearance and causing wrinkling of the shade down its middle.

In the mid-1970's, the Applicants introduced to the market the first roll window shade capable of being

sized to fit a given window opening without the use of cutting tools while the shade was fully rolled on the roller with the shade material being secured along substantially its entire width to a hand-sizable roller having a substantially uniform outer diameter. This invention permitted not only hand-sizing of the window shade assembly but also provided that capability without the need for unrolling of the shade and without the drooping and wrinkling found in other window shade assemblies employing a telescoping roller. In this respect, attention to United States Patent Nos. 4,102,384, 4,102,383 and 4,102,385 is drawn.

In U.S. Patent No. 4,102.384, the window shade assembly comprises a roller including a first tubular roller section, a second roller member having one end telescopingly seated within the first member and a tube surrounding the axially projecting portion of the second member and abutting the end of the first member to provide a smooth outer roller surface. The shade material is secured to the larger roller member and to the tube along substantially its entire width. The attachment of the shade to both the larger roller member and the tube fixes the tube against rotation with respect to the larger roller member. However, the attachment does not interfere with telescoping of the roller members. The fixed tube with the shade material attached prevents the shade material from drooping along the side depending from the smaller roller member. The tube has at its end a series of longitudinally spaced, circumferentially extending strip lines substantially coincident with the strip lines of the shade such that on sizing of the shade the excess shade material is hand stripped along a chosen strip line while rolled on the roller to expose a corresponding length of tube which may be removed by severing it along a

circumferential strip line and sliding it over the end of the smaller roller section. The operation is complete by pushing the smaller roller member into the larger roller section.

It is an object of this invention to provide one or more of the following features:-

(a) a roll window shade assembly capable of being hand stripped while rolled on the roller without the need for cutting tools but one which includes a roller assembly which is simpler to operate and easier for the consumer to size,

(b) hand-sizable window shade assembly which eliminates the telescoping roller and provides instead a non-telescoping roller assembly which is more easily sizable by the user whereby the window shade assembly may be more simply and conveniently sized by the consumer in the home, and which, once sized at home and mounted in a window opening, is strong and will withstand the rigors of everyday use, and

(c) a window shade assembly which retains the highly desirable feature of a smooth and uniform outer roller surface to prevent drooping and wrinkling of the window shade material.

In accordance with one aspect of the invention an adjustable window shade assembly comprises a roller having a tubular end portion comprising a plurality of discrete roller segments and flexible and resilient means for detachably interconnecting the roller segments end-to-end one to another, each segment having an outer roller surface of predetermined axial dimension, a shade secured at one end along the length of the roller, the shade having at least at one marginal side portion thereof a plurality of spaced hand-strip lines extending from end-to-end substantially parallel to the shade edges and defining discrete widths of shade material

therebetween which may be hand-stripped along the lines, the axial dimension of each of the roller segments being substantially coincident with one of the discrete widths of shade material lying between the hand-strip lines the length of the roller being reduced by detaching a number of the discrete roller segments equal in length to the width of shade material removed from the shade.

In accordance with another aspect, the invention comprises a method of adjusting the size of a window shade assembly including a roller having a tubular end portion formed of a plurality of discrete roller sections detachably inter-connected end-to-end one to another by flexible and resilient means forming a snap fit therebetween and a shade secured at one end along the length of the roller and having a plurality of spaced hand-strip lines extending from end-to-end, substantially parallel to the edges of the shade to form discrete widths of shade material therebetween, the discrete widths of shade material being substantially coincident with the detachable segments of the tubular end portion, comprising determining the desired width of the shade, hand stripping the shade along the hand-strip line closest to the determined width of the shade, and unsnapping the length of the roller segments from the tubular end portion substantially equal in length to the discrete widths of shade material removed from the shade from the endmost segment remaining with the roller.

Preferably the flexible and resilient connections permit the roller segments to be snapped together during manufacture with the roller length being determined by the number of segments used. That is, the length of the roller can be increased merely by snapping additional segments onto the end of the roller. In sizing of the roller by the consumer in the home, the length of the roller is made to conform to the stripped

shade width merely by unsnapping the excess length of roller segments from the endmost segment remaining with the roller. This operation is easily and conveniently accomplished, and there is no requirement to telescope one roller member into another.

The shade material is secured at one end along the length of the roller and includes along one marginal side portion a plurality of hand-strip lines extending from end-to-end substantially parallel to the shade edges. These strip lines define discrete widths of shade material therebetween, e.g., one-half inch increments, such that the width of the shade material may be decreased from one increment up to the total of the increments to conform it to the width of a given window opening. Sizing of the shade material may be accomplished while the shade is rolled on the roller merely by hand-stripping along a chosen strip line and unwinding the excess shade material from the roller as stripping towards the roller proceeds.

The roller surfaces of the roller segments conform in width to the width of shade material between strip lines such that when the excess shade material is removed, a corresponding excess roller length is exposed which may be removed merely by unsnapping it from the endmost segment remaining with the roller. As a result, the end of the roller and the new edge of the stripped shade substantially coincide.

The window shade assembly may further include a motor at one end for mounting the assembly in a window opening, rewinding the roller in known fashion and an end plug at the opposite end carrying a pin for mounting the other end of the roller in the window opening. The end plug is removable from the stripped end of the roller and insertable back into the roller after sizing thereof.

In one presently preferred form of the invention, the window shade assembly includes a roller assembly made up of a first tubular roller member having an open end, a second tubular roller member formed of a plurality of discrete roller segments which are interconnected end-to-end, and a coupler for mounting the second roller section to the open end of the first roller section. The outside diameter of the two roller members are the same such that the roller assembly has a substantially smooth and uniform outer roller surface to which the shade material is attached. Each of the discrete roller segments includes a male and female connection at opposite ends thereof. The segments are preferably formed of a resilient material such as a plastics and are interconnected by snap fitting the male connection of one segment into the femal connection of an adjacent segment. The length o the second roller member is thus a function of how many discrete roller segments are snapped together. The end of the second roller section interconnecting with the coupler is done by means of a male connection of the roller interconnecting with a female connection of the coupler. At the opposite end of the second roller section is a female connection which receives a cylindrical end plug carrying a gudgeon pin. The end plug includes integrally molded cylindrical elements for protecting the gudgeon pin during transit and storage of the window shade.

The shade material includes at one marginal side portion a plurality of longitudinally spaced, circumferentially extending strip lines parallel to the edges of the shade and to one another which define discrete widths of shade material therebetween. The shade material is adhered directly to the surface of the roller assembly including the interconnected detachable

segments of the second tube member. The width of the discrete segments which form the roller surface is the same as the distance between the hand-strip lines such that when the shade material is secured to the roller assembly the strip lines are substantially coincident with the discrete roller segments.

The steps required to size the window shade of this invention include simply grasping the shade material at its hem end with the shade being in its rolled position on the roller, stripping off the excess width of the shade material by unwinding the shade along a chosen strip line, and then detaching the discrete roller segments exposed when the shade material is removed corresponding to the total excess width of shade material removed. This is accomplished simply by unsnapping the length of exposed adjoining segments from the endmost segment remaining with the roller after stripping of the shade material. The end plug disposed in the endmost segment of the second roller member is then removed and placed into the female end connection of the endmost segment remaining with the roller, which now forms the end of the second member after the sizing operation has been completed.

In summary, a preferred window shade of this invention provides an improved window shade assembly which permits very simple and easy hand-sizing of the window shade assembly while retaining the advantages of the capability of sizing with the shade material while rolled on the roller and without any drooping or wrinkling of the shade material.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an elevational view, partly in section showing a presently preferred form of the

invention.

Figure 2 illustrates one step in the sizing of a shade in accordance with the present invention.

Figure 3 is an exploded view of one end of the window shade assembly of this invention showing how adjustment of the length of the window shade roller assembly is accomplished.

Figure 4 is a partial view of one end of the assembled window shade assembly after sizing.

Referring to Figures 1 and 3, the window shade assembly of this invention includes a roller assembly 10 comprising a first tubular roller member 12 having an open end 13, a second tubular member 14, and a coupler 15 disposed in the open end 13 of the roller member 12 to join the first roller member 12 and second tubular member 14, and a coupler 15 disposed in the open end 13 of the roller member 12 to join the first roller member 12 and second roller member 14 together. The first roller member 12 can be formed of any of a number of materials including, for example, rolled and locked seamed metal tubing. The second tubular member 14 is made up of a plurality of discrete roller segments 16 each having a male end connection 18 and a female end connection 20. The male end connection 18 at one end of each roller segment 16 comprises an annular section or groove 21 offset radially inwardly from an outer roller surface 17 and an annular lip 23. The recessed portion or groove 21, lies between the lip 23 and a shoulder 19 extending radially outwardly to the outer surface 17 of segment 16. The female end connection 20 of segment 16 is formed with an annular lip 24 extending radially inwardly at the open end 25 opposite the male connection 18. The female end connection 20 receives the male end connection 18 through the opening 25. The connecting members 18 and 20 are molded of a flexible

and resilient plastic material such as an acetal resin sold under the Trade Mark Delrin and are dimensioned such that when the male end connection 18 is inserted through the opening 25, the application of a small axial force will cause the members to snap together snugly with the annular lip 24 of the female connection 20 snapping into the groove 21 of the male end connection 18 between the shoulder 19 and lip 23. The lip 24 of the female connection 20 thus engages the lip 23 of the male connection 18 to join the two roller segments 16 tightly together. The lip 24 of the female end connection 20 and the lip 23 of the male end connection 18 may be chamfered, e.g. on a 45° angle, to aid in the insertion of the male end connection 18 of one segment 16 into the female end connection 20 of an adjoining segment 16. In addition, the male end connection 18 is offset radially inwardly from the outer surface 17 of segment 16, and groove 21 is dimensioned relative to the lip 24 of the female end connection 20 such that the male and female end connections 18, 20 of adjoining segments snap together tightly and interlock with sufficient force to prevent relative rotation between adjoining segments 16. Nevertheless, as described below, the adjoining roller segments 16 may be easily detached one from another by hand to conform the length of the roller assembly 10 to the given window opening.

More particularly, in one presently preferred form of the invention, the dimensions of the male end connection 18 and female end connection 20 are such that there is a .012-.014 inch interference between the annular lip 23 and the lip 24. Thus when the parts are snapped together, the lip 24 must expand and the lip 23 contract. Once snapped together, the lips return to their original dimensions, and there is a zero

interference fit in the radial direction between lip 24 and groove 21. In the axial direction, there is a .003 inch interference between the lip 24 and the lip 23 and shoulder 19. As stated above, both sides of the lips 523 and 24 may be chamfered, e.g., on a 45° angle. As a result, when the parts are snapped together they mate in the axial direction along these chamfered surfaces which are tightly urged together by the interference fit of the parts.

10 It will be appreciated, therefore, that the interfering elements must be flexible and resilient to accommodate the stresses imposed on them, both on removal of the segments 16 from the mold and on snapping them together, without cracking. In this 15 regard, it has been determined that the mold should employ multiple gates (e.g., four gates) or a fan gate to avoid creating a single weld line in the part of insufficient strength to accommodate the hoop stresses imposed on the part.

20 As shown in Figure 1, the second roller section 14 is thus made up by joining a number of segments 16 end-to-end and one to another. The length of the roller member 14 is determined by how many segments 16 are used.

25 The coupler 15 includes an elongated, axially extending tubular portion 26 which is secured within the open end 13 of the roller member 12 and an outwardly projecting end 27 which is formed with a female end connection 20 identical to that of segments 3016. The coupler 15 is likewise molded of Delrin, and is so dimensioned with respect to the metal first roller member 12 to create a slip fit therebetween. The coupler 15 is held in position in the open end 13 of the roller 12 by crimping or dimpling the metal 35roller 12 to grasp the coupler 15. In addition, when

the roller 12 is formed with an inwardly projecting lock seam, the inserted portion 26 of the coupler 15 may be provided with an axially extending depression to receive the lock seam on insertion of the coupler 15 into the open end 13. The engagement of the lock seam in the depression prevents relative rotation between the coupler 15 and the roller 12.

The tubular roller member 14 is thus connected to roller member 12 by snap-fitting the male end connection 18 of an end segment 16 of the tube section 14 into the female end connection 27 of coupler 15. As shown in Figure 1, the segments 16 are connected end-to-end from the coupler 15 such that the female end connections 20 of adjoining segments 16 face outwardly from the coupler 15 to receive the male end connection 18 of a next adjoining segment 16. Therefore, the end segment 16 at the end of the tubular roller member 14 opposite coupler 15 provides an open-ended female end connection 20.

In a presently preferred embodiment of this invention, the outer surface 17 of each segment 16, i.e., the portion between should 19 and end 20, is approximately one-half inch in length and has an outside diameter substantially identical to the outside diameter of roller member 12, as shown in Figure 1. Therefore, the outer surface of the assembled roller members 12 and 14 is of uniform outer diameter forming a smooth outer roller surface extending from end-to-end of the roller assembly 10.

A shade 28 is attached directly to the roller assembly 10 along one end 29. The particular method of attachment is not critical, and a suitable method includes the use of a single sided masking tape such as two inch wide tape sold by Minnesota Mining and Manufacturing Company under the designation 2505 or

double-sided tape sold by the same company under the designation Y950.

The left end of roller member 12 as viewed in Figure 1, opposite the tube section 14 is adapted to receive a spring motor 30 which includes a torque rod 32 connected to one end of a rewind spring 34. The torque rod 32 is fixed to spear 36 which projects from the left end of the roller assembly 10 and is engageable with a flat slot of a window shade bracket (not shown) by which the one end of the window shade assembly 10 is supported in the window opening. A cap 38 encloses means for tensioning and releasing the spring motor 30 (not shown) through which the spring motor 30 and torque rod 32 are connected to the roller assembly 10 for winding the shade 28 on the roller assembly 10.

Referring to the right hand portion of Figure 1, a cylindrical end closure or plug 40 is provided having a cylindrical gudgeon pin 42 extending from one end thereof which is engageable with and rotates in the other of the window shade brackets (not shown) supporting the window shade assembly 10 in the window opening. In the embodiment shown, the pin 42 is riveted in the end closure 40. A pair of annular sleeves 41 are integrally molded to one another and to the outer edge 43 of plug 40. The sleeves 41 extend outwardly from the edge 43 enclosing the gudgeon pin 42 to protect the pin 42 from damage during shipment and storage of window shade 10. Lines of weakness 44 are provided so that on sizing, as hereinafter described, the sleeves 41 may be broken off by hand to expose the pin 42. The sleeves may be used to locate the pin axially if need be. The other end of the end closure 40 is formed with a stepped tubular stem portion 45 adapted to be removably inserted through the female end

connection 20 of the endmost roller segment 16 of roller member 14 and into light frictional engagement with both the female connection 20 and the radially inwardly extending male end connection 18.

The shade 28 in the embodiment shown in Figure 1 includes one marginal edge portion 46 having a plurality of spaced, preferably invisible hand-strip lines 48 extending from the base or hem end 50 of the shade 28 to the end 29 which is secured to roller assembly 10. The lines 48 are substantially parallel one to another and to the side edge 47 of the shade and are separated by a predetermined distance to permit decreasing of shade width by incremental amounts up to the total or sum of separations. For examples, the shade may be formed with twenty-four strip lines separated by one-half inch increments forming a total of twenty-four discrete shade widths 49 therebetween, thus permitting sizing of the shade width from one-half inch up to twelve inches. The number of discrete roller sections 16 is equal to the number of discrete shade widths 49 to permit removal of one or more roller sections corresponding to the excess width of the shade material stripped from the assembly.

At the base 50 of shade 28 is a hem 52 into which a slat 54 is inserted for grasping to raise and lower the shade 28. The slat 54 includes a plurality of spaced lines of weakness 56. These lines of weakness 56 may be formed, for example, by profile extrusion of a plastic hem slat wherein score lines 56 are mechanically formed on both sides of the slat during the extrusion process. The lines of weakness 56 substantially coincide with the strip lines 48 in shade 28 so as to permit shortening of the slat 54 by the same amount as shade 28 is decreased in width. The particular manner of forming the strip lines 48 in

shade 28 and the lines 56 in slat 54 does not form a part of this invention, and techniques to do so are available in the art. For example, the strip lines 48 may be formed by scoring vinyl shade material. Preferably, the score lines are invisible to retain the aesthetic appearance of the shade.

The shade 28 is directly attached to roller members 12 and 14 such that the strip lines 48 in shade 28 are coincident with the joint line between adjoining segments 16 of tube section 14. In other words, each of the hand strip lines 48 defining the discrete widths 49 of shade material therebetween are substantially coincident with either the shoulder 19 or end 20 of an individual segment 16 which define therebetween the outer roller sections 17.

In sizing the window shade to the desired size, only a few simple steps are required without the need for cutting devices or other tools. The desired length of the window shade assembly is determined by measuring the window opening or by placing the shade against the window opening to mark the appropriate strip line 48 along which the shade material 28 should be hand-stripped to remove the excess material shade. The slat 54 is slid axially out of the hem 52 a distance sufficient to allow the excess shade material to be stripped. With the shade in the rolled condition, the shade material is grasped by hand at the hem end 50 and torn along the chosen strip line 48. As shown in Figure 2, the stripping commences at the base or hem end 50 of the shade 28 and proceeds by unwinding of the shade material with the tear following the chosen strip line 48 until it reaches the roller member 14 of roller assembly 10. At the roller member 14, the shade material is pulled from the roller to separate it from the assembly. The excess shade material is then

discarded. Hand-stripping of the shade material exposes one or more of the segments 16 depending on which strip line 48 was chosen, i.e., how many discrete widths 49 of shade material were removed. The segment or segments 16 projecting outwardly from the newly formed edge 58 of the shade 28 are then detached from the remainder of the segments 16 forming tube section 14, as shown in Figure 3, by disengaging the male end connection 18 of the innermost segment 16 to be removed from the female end connection 20 of the outermost segment 16 to remain. This is accomplished by simply unsnapping the two segments. At this point, the female end connection 20 of the now outermost segment 16 of tube section 14 is substantially in alighnment with the newly formed edge 58 of shade 28. The end closure 40 is then removed from the original outermost segment 16, and the sleeves 41 are detached from end closure 40 exposing gudgeon pin 42. The end closure 40 is then inserted through the female end connection 20 and into engagement with the radially innermost annular surface of the male end connection 18 of the segment 16 which now forms the end portion of tube section 14.

As shown in Figure 4, if some additional roller length adjustment is needed to mount the gudgeon pin 42 to the window brackets, one or both of the sleeves 41 may be placed along the tubular stem portion 45 of end closure 40 and against its outer end 43. The sleeve or sleeves 41 abut the edge 60 of the endmost segment 16 as the end closure 40 is inserted into the end of tube section 14, thus disposing the closure 40 and gudgeon pin 42 outwardly from the end of tube section 14 a distance equal to the width of the sleeve or sleeves 41 used. Finally, the hem slat 54 is replaced with the excess length being broken off at the closest line 56 of weakness.

CLAIMS:

1. An adjustable window shade assembly comprising a roller (10) having a tubular end portion (14) comprising a plurality of discrete roller segments (16) and flexible and resilient means (18,20) for detachably interconnecting the roller segments (16) end-to-end one to another, each segment having an outer roller surface (17) of predetermined axial dimension, a shade (28) secured at one end along the length of the roller (10), the shade having at least at one marginal side portion thereof a plurality of spaced hand-strip lines (48) extending from end-to-end substantially parallel to the shade edges (47) and defining discrete widths of shade material therebetween which may be hand-stripped along the lines (48), the axial dimension of each of the roller segments (16) being substantially coincident with one of the discrete widths of shade material lying between the hand-strip lines (48), the length of the roller (10) being reduced by detaching a number of the discrete roller segments (16) equal in length to the width of shade material removed from the shade (28).

2. A window shade as claimed in Claim 1 further characterized in that the roller (10) has a substantially uniform outer diameter from end-to-end to provide a smooth, uniform roller surface (17) for attachment of the shade thereto.

3. A window shade as claimed in either Claim 1 or 2 wherein the discrete roller segments (16) each include a male connection (18) and a female connection (20) at opposite ends, the segments being detachably interconnected end-to-end by engagement of the male connection of one segment into the female connection of an adjacent segment.

4. A window shade as claimed in Claim 3 wherein the male connection (18) of each segment is formed to be snap-fitted into the female connection (20) of an adjacent

segment.

5. A window shade as claimed in Claim 3 wherein the male end connection (18) comprises a radially outwardly extending annular lip (23), a shoulder (19), and a groove (21) therebetween.

6. A window shade as claimed in Claim 5 wherein the female connection (20) comprises a radially inwardly extending annular lip (24) adapted to be received in the groove (21) of the male end connection (18).

7. A window shade as claimed in any preceding claim further comprising an end closure (40) having a stem portion at one end and a gudgeon pin (42) at the other end adapted to be removably mounted in the end of the tubular end portion, the end closure being formed with detachable sleeves (41) extending outwardly therefrom for protecting the gudgeon pin (42).

8. A window shade as claimed in Claim 7 wherein the detachable sleeves (41) are adapted to be broken off the end closure (40) and inserted over the stem portion of the end closure on sizing of the window shade for extending the gudgeon pin (42) outwardly from the end of the tubular end portion a distance equal to the width of each sleeve (41).

9. An adjustable window shade assembly comprising a roller (10) having a substantially uniform, smooth outer roller surface (17) from end-to-end and including a tubular end portion (14) adapted to be sized by hand to decrease the length of the roller, the tubular end portion comprising a plurality of discrete roller segments (16) formed of a flexible and resilient plastic material detachably interconnected end-to-end one to another, each segment (16) including a male end connection (18) at one end thereof and a female end connection (20) at the other end thereof, and an outer roller surface (17) of predetermined axial dimension, the female end connection of one segment receiving and capturing the male end

connection of an adjacent segment, the outer roller surface of each sement mating and co-operating with its adjacent segment to form a substantially uniform, smooth outer roller surface (17) of the tubular end portion, the segments (16) being separable by hand by removing the male end connection from the adjoining female end connection, a shade (28) secured at one end along the length of the roller, the shade having at least at one marginal side portion thereof a plurality of spaced hand-strip lines (48) extending from end-to-end substantially parallel to the shade edges (47) and defining discrete widths of shade material therebetween which may be hand-stripped along the lines, the axial dimension of each of the roller segments (16) being substantially coincident with one of the discrete widths of shade material lying between the hand-strip lines (48), the length of the roller (10) being reduced by detaching a number of the discrete roller segments (16) equal in length to the width of shade material removed from the shade (28).

10. A window shade as claimed in Claim 9 wherein the male end connection (18) comprises a radially outwardly extending annular lip (23), a shoulder (19), and a groove (21) recessed from the outer roller surface (17) of the segment extending therebetween, the female end connection (20) comprises a radially inwardly extending annular lip (24) the lip of the female end connection being captured in the groove (21) of the male end connection, the end connections being so dimensioned to provide (a) an interference between the lip (23) of the male end connection and the lip (24) of the female end connection in the radial direction, (b) a zero interference between the lip (24) of the female end connection and the groove (21) in the radial direction, and (c) an interference between the lip (24) of the female end connection and the lip

(23) of the male end connection and the shoulder (19) in the axial direction.

11. An adjustable window shade assembly comprising a roller (10) having a first tubular member (12) having an open end, a second tubular member (14), and a coupler (15) receivable in the open end of the first tubular member joining the second tubular member thereto, the roller (10) having a substantially uniform, smooth outer roller surface (17) from end-to-end, the second tubular member (14) comprising a plurality of discrete roller segments (16) formed of a flexible and resilient plastic material detachably interconnected end-to-end one to another, each segment (16) including a male end connection (18) at one end thereof and a female end connection (20) at the other end thereof, and an outer roller surface (17) of predetermined axial dimension, the female end connection of one segment receiving and capturing the male end connection of an adjacent segment, the outer roller surface (17) of each segment mating and co-operating with its adjacent segment to form a substantially uniform, smooth outer roller surface of the second roller member (14), the segments (16) being separable by hand by removing the male end connection from the adjoining female end connection, the coupler (15) having a female end connection (27) to receive the male end connection (18) of the endmost segment of the second roller member at one end thereof, the second tubular member (14) having at the opposite end thereof a female end connection (18) receiving and supporting a removable end closure, a shade (28) secured at one end along the length of the roller, the shade having at least at one marginal side portion thereof a plurality of spaced hand-strip lines (48) extending from end-to-end substantially parallel to the shade edges (47) and defining discrete widths of shade material therebetween which may be hand-stripped along

the lines (48), the axial dimension of each of the roller segments (16) being substantially coincident with one of the discrete widths of shade material lying between the hand-strip lines (48), the length of the roller (10) being reduced by detaching a number of the discrete roller segments equal in length to the width of shade material removed from the shade (28).

12. A method of adjusting the size of a window shade assembly including a roller having a tubular end portion formed of a plurality of discrete roller sections detachably inter-connected end-to-end one to another by flexible and resilient means forming a snap fit therebetween and a shade secured at one end along the length of the roller and having a plurality of spaced hand-strip lines extending from end-to-end, substantially parallel to the edges of the shade to form discrete widths of shade material therebetween, the discrete widths of shade material being substantially coincident with the detachable segments of the tubular end portion, comprising determining the desired width of the shade, hand stripping the shade along the hand-strip line closest to the determined width of the shade, and unsnapping the length of the roller segments from the tubular end portion substantially equal in length to the discrete widths of shade material removed from the shade from the endmost segment remaining with the roller.

13. A method as claimed in Claim 12 wherein the window shade assembly comprises an end closure carrying a pin for mounting of said window shade assembly in a window opening, the end closure having a portion receivable by the segments to support the end closure in the roller, the method further including removing the end closure from one of the length of segments detached from the tubular end portion, and connecting the end closure to the endmost one of the segments remaining with the roller.

14. A method as claimed in Claim 13 wherein the end closure comprises a stem portion at one end and a gudgeon pin at the opposite end, and detachable sleeves mounted at the opposite end and extending outwardly therefrom for protection of the gudgeon pin, the stem being adapted to be received by the segments to support the end closure in the roller, the method further including detaching the sleeves from the end closure, and optionally disposing one or more of the sleeves along the stem portion of the end closure before connecting the end closure to the endmost one of the segments remaining with the roller.

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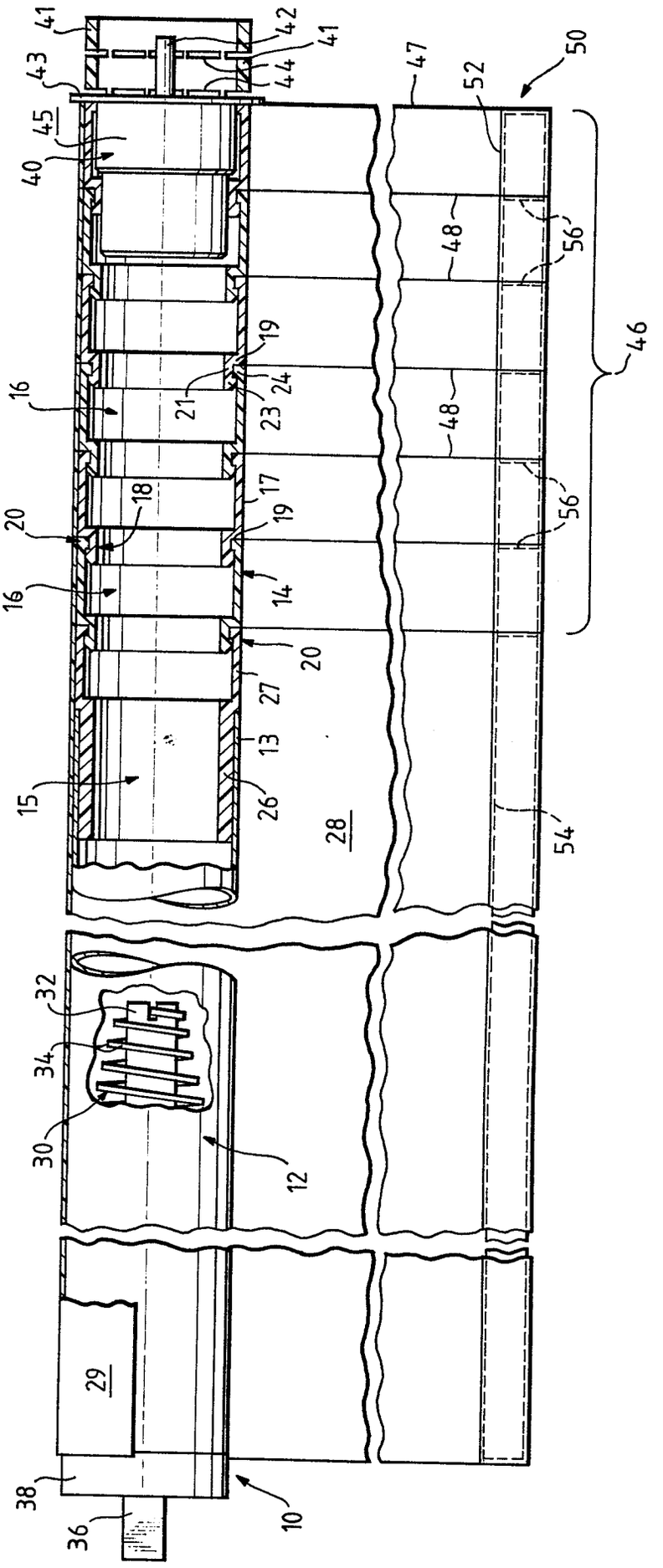
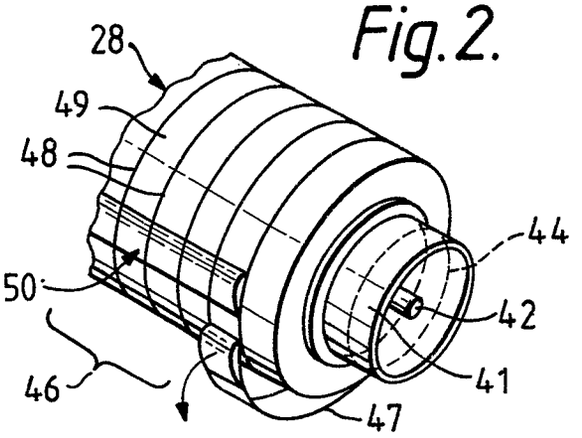


Fig. 1.

Fig.2.



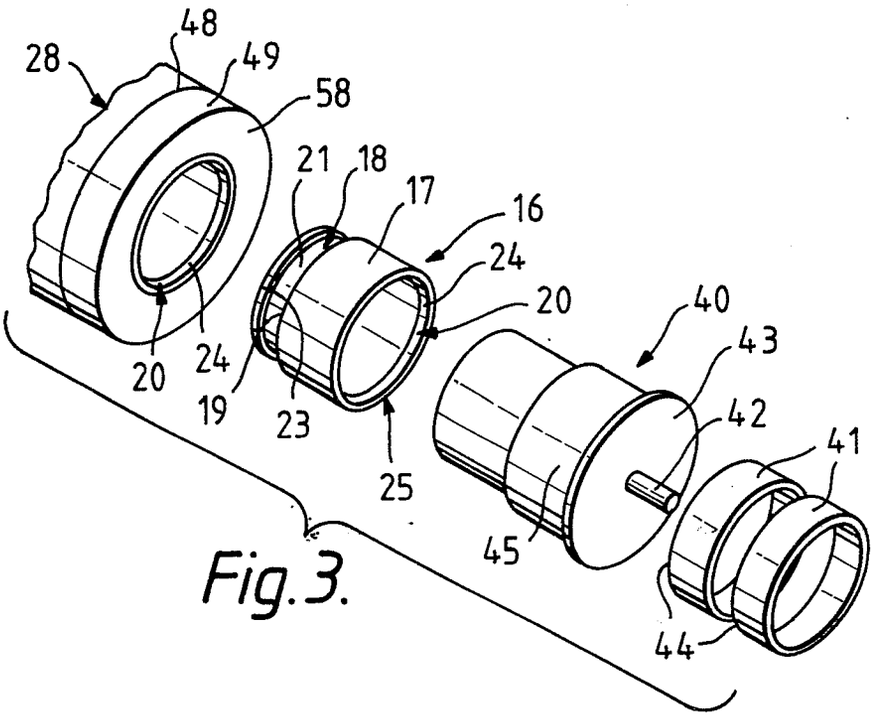


Fig.3.

Fig.4.