Dec. 22, 1942. F. S. SMITH 2,306,086

THERMALLY INSULATING WINDOW SHADE CONSTRUCTION

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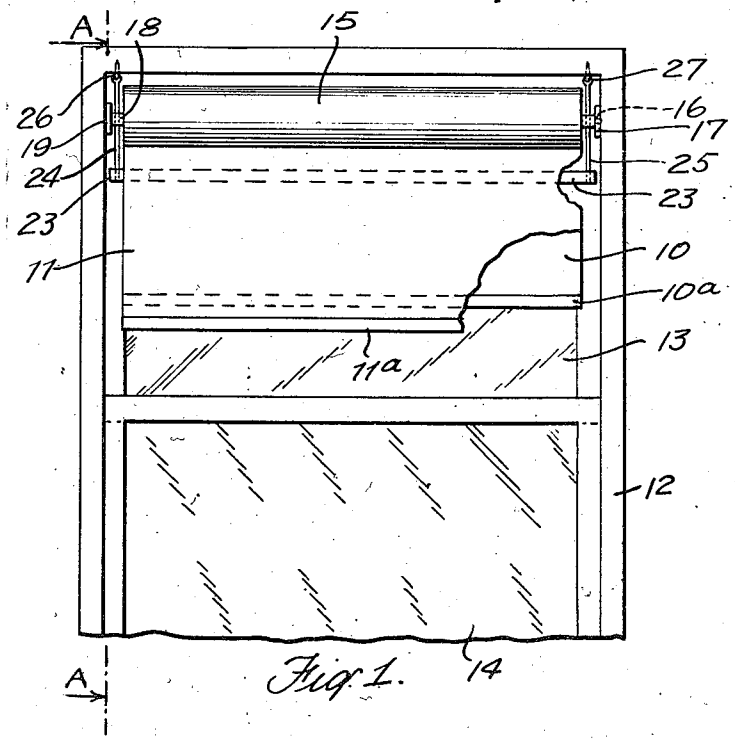


Fig. 1.

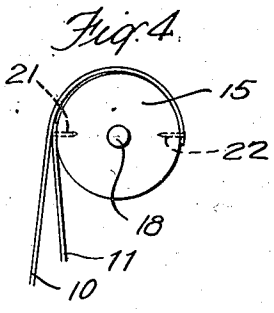


Fig. 4.

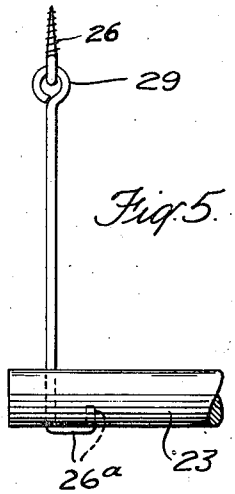


Fig. 5.

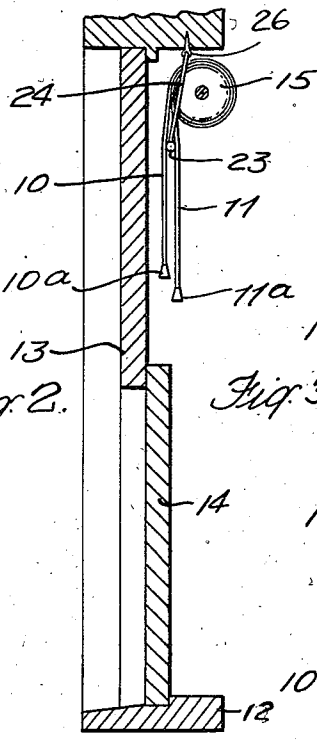


Fig. 2.

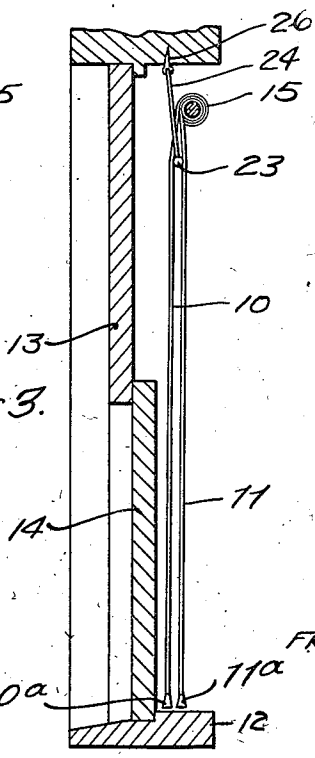


Fig. 3.

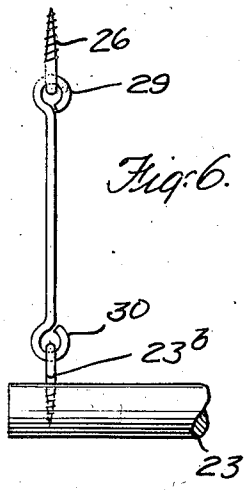


Fig. 6.

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Fig. 7.

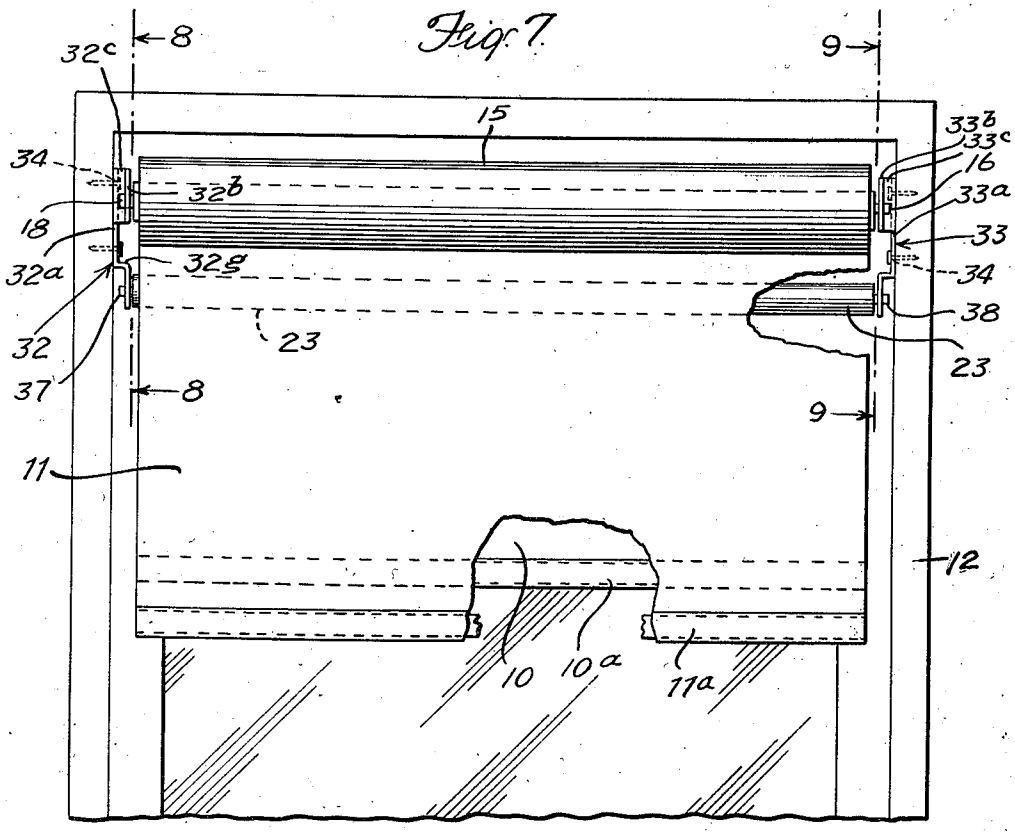


Fig. 8.

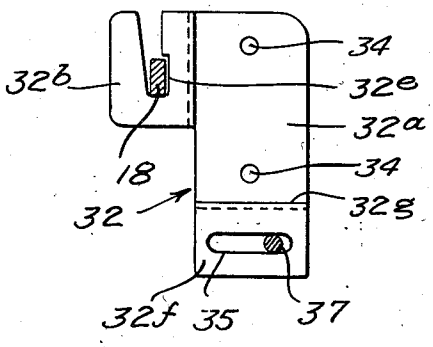
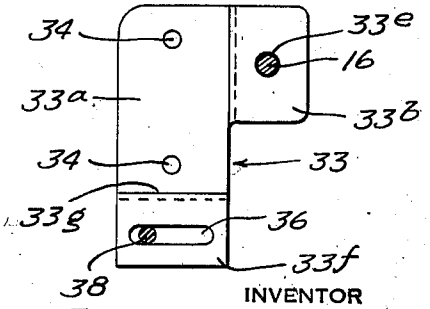


Fig. 9.



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THERMALLY INSULATING WINDOW SHADE CONSTRUCTION

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Application September 23, 1942, Serial No. 459,382

11 Claims. (Cl. 160—121)

This invention relates to thermally-insulating window shade construction.

One of the objects of this invention is to provide a simple, inexpensive and dependable window shade construction for efficiently reducing heat loss in either direction through the window or window opening in the wall of a building or the like. Another object is to provide a construction of the above-mentioned character which will be easy, simple and quick to install, capable of simplicity and ease of operation or manual manipulation, and well adapted for resisting the transmission of heat outwardly as in winter, or inwardly as in summer. Another object is to provide a construction of the above-mentioned character which will lend itself readily to quick and inexpensive adaptation to familiar or known forms of window shades and which will lend itself readily to quantity production at reasonable cost. Another object is to provide a simple, inexpensive and reliably-acting means for insuring the intended or desired structural and functional relationships when the shade is manipulated or in use; another object is to provide such a means that will not interfere with or jam the rolling-up action of the shade roller or rollers. Another object is in general to provide an improved thermally-insulating window shade construction that will be of dependable and lasting action and free from substantial maintenance costs and annoyances. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are shown several of the various possible embodiments of the mechanical features of my invention,

Figure 1 is a front elevation of a window frame or sash with illustrative windows therein, showing the assembly thereto of my thermally-insulating window shade construction, as viewed when looking at the installation from the inside of a room or the like;

Figure 2 is an end elevation as seen along the line A—A of Figure 1 showing the relationship of certain parts and their action when the shade is "up";

Figure 3 is a view like that of Figure 2, showing the relationship and action of certain of the parts when the shade is "down";

Figure 4 is a diagrammatic end view of a single shade roller showing a preferred mounting thereon of several "shades" or sheet materials;

Figure 5 is a detached fragmentary view on an enlarged scale showing a possible mounting of one of the parts of the construction;

Figure 6 is a view like that of Figure 5, but showing a modified form;

Figure 7 is a front elevation like that of Figure 1 showing a modified form of mounting and assembly;

Figure 8 is an end elevation on an enlarged scale as seen along the line 8—8 of Figure 7, showing a possible form of bracket support for mounting the structure and for insuring functional coaction between the parts, and

Figure 9 is a view on an enlarged scale as seen along the line 9—9 of Figure 7, showing a companion bracket support to that shown in Figure 8.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring first to Figures 1, 2 and 4, I provide two "shades" 10 and 11 of any suitable or known shade material and of a width adequate to fit into the width of the window frame 12 with appropriate clearances at the vertical longitudinal margins and of a length a little bit greater than the length of the opening in the window frame 12, the latter having any suitable kind or type of "windows," such as an upper window sash 13 and a lower window sash 14, mounted in any suitable way for up and down suitable movement.

The two sheets of material forming the shades 10 and 11 I mount in the window frame 12 to provide always between the two sheets a suitable space as is later described, and conveniently and illustratively, I may support the two sheets or shades 10 and 11 from a single roller indicated at 15 in Figures 1, 2 and 4.

This shade roller 15 may be and preferably is of any known or standard or readily available construction, being provided at one end, the right-hand end as seen in Figure 1, with a supporting pin or pivot 16 that is round and that is receivable in a hole in any conventional type of shade roller bracket indicated at 17, thus rotatably to support that end of the roller.

The other end of the roller has a coaxial stud or pin 18 that is usually rectangular in cross-section to be non-rotatably received in a slot in any usual or familiar type of companion bracket

19 secured to the window frame 12 in juxtaposition to the bracket 17.

The left-hand end of the roller 15 is hollowed out to receive a helical spring and winding guide or drum, the latter being connected with the non-rotatable supporting stud 18, and is otherwise provided with the usual ratchet mechanism, whereby the spring is wound up and has energy stored in it when the shade is pulled down, such energy being available to wind the shade up on the roller when the holding ratchet or ratchets are made to release, in well known manner; since these elements are old and well known they are not shown in the drawings and need not be further described.

Where I support both sheets 10 and 11 from the same roller, I preferably make one of them a little longer than the other and secure them, as is better shown in Figure 4, to the roller 15 at about diagrammatically opposite lines along which securing devices, such as tacks or staples 21 for the inner shade 11 and 22 for the outer shade 10, function to anchor the upper ends of the two shades. By thus angularly spacing the lines along which the two shades are secured, I can achieve a less broken cylindrical roller base upon which the rest of the shade sheets are wound up, attaining smoother action thereby, and there is also less risk of disrupting the fastenings of the shade sheets to the roller than if they were secured along the same line and by the same nails or staples or the like.

I then provide a shade-spacer member generally indicated by the reference character 23 and this may conveniently be made of wood, preferably of circular cross-section. It has a length (see Figure 1) somewhat greater than the width of the shades 10 and 11 and somewhat less than the spacing between the inside faces of the window frame 12, the latter factor contributing toward insuring freedom of motion of displacement of the member 23, as will later be described in greater detail.

The rod 23 (see Figures 1, 2 and 3) extends between the two shades 10 and 11 and in thickness is preferably proportioned according to the normal or usual or average conditions of atmospheric pressure and temperature of the place or region where the installation is to be employed. Thus in conditions of atmospheric pressure on the order of normal pressure of 14.7 pounds per square inch and a normal or average temperature of 20° C., as for example in the temperate zone at or about sea level, a suitable and preferred thickness of the member 23 and hence of the spacing between the shades 10—11 is about 3/8"; this preferred spacing is selected in relation to the stationary air film, which, for the above conditions, is about 0.44 centimeter. Adjacent each of the inside faces or surfaces of the shades 10 and 11, I can then have a stationary air film and the sum of the two is such that thereby I am enabled to avoid substantial convection currents in the space between the two shades 10—11.

The spacer member 23 I preferably mount, as above indicated, for bodily displacement or self-adjusting movement in a direction parallel to itself and a convenient and illustrative supporting means for this purpose comprises two suspension elements 24 and 25 suitably secured at their lower ends to the respective ends of the spacer member 23 and suitably secured at their upper ends, as by screw eyes 26 and 27 respectively to a suitable stationary support, conveniently the upper cross member of the window frame 12, so that thereby the spacer member 23 is free to move parallel to itself, but always to keep the desired spacing between the two shades 10—11, according to whatever happens to be the gross diameter at the shade roller 15, namely, the sum of the diameter of the roller 15 itself and the thicknesses of as many turns of the shade sheets that happen to be coiled about the roller 15. Thereby also the spacer member 23 is free to accommodate itself to any particular direction in which the shades are conjointly pulled down or guided for winding up manually.

These actions of the spacer member 23 will also be apparent by comparison of Figures 2 and 3; in Figure 2, the shades 10 and 11 are shown pretty much rolled up so that the effective diameter of the roller 15 with the turns of sheet material thereon is relatively large, and in such case the spacer 23 assumes a position with its axis substantially in the plane of tangency to the cylinder of the above-mentioned effective diameter at the point or line (the 9 o'clock position as viewed in Figure 2) where the downwardly extending unrolled portions of the shades take off of that cylinder.

Furthermore, the member 23 is in a horizontal plane just below the maximum possible effective diameter and accordingly such portions of the shades 10—11 as extend below the spacer member 23 hang parallel to each other and the above-mentioned spacing is thus maintained, it being noted that the shades 10 and 11 may be provided at their lower ends with the usual hems to receive cross-sticks 10^a and 11^a, the weight of which aids in these actions.

If now the shades are pulled all the way down as shown in Figure 3, the effective diameter of the roller 15 is much less than it was in the relationship of Figure 2 and the vertical plane of tangency in which is the axis of the spacer member 23 is now much closer to the axis of the roller 15 and the above-mentioned mounting of the spacer member 23 permits the latter to adjust itself to this new circumstance and, of course, to any intermediate condition. This is particularly effective where the window construction comprises an upper sash 13 that is displaced outwardly from the lower sash 14, for the follow-up or self-adjusting action of the spacer member 23 in coaction with the changing effective diameter of the roller keeps the properly spaced shades 10—11 in the desired proximity to the upper windom sash 13 when the shade is let up one-half or more, and when the shade is one-half or more pulled down, as in Figure 3, the corresponding movement of the spacer member 23 to the right insures maintenance of the desired spacing between the two shades all the way down and also in front of the lower inwardly displaced window sash 14, thus avoiding material interference by the upper inner horizontal corner edge of the lower window sash 14.

In the position of Figure 3, maintenance of the desired spacing at the lower ends of the shades 10—11 is aided by the cross-sticks 10^a—11^a, being as is usual tapered in vertical cross-section, being thicker at their lower edges than at their upper edges, the lengths of the two sheets of the shades 10—11 being preferably so proportioned in relation to whatever angularity of fastening (see Figure 4) that may be employed that the cross-sticks 10^a and 11^a and hence the extreme lower edges of the two shades when in lowermost position, as in Figure 3, are at the same level or match each other, thus to make most

effective maintenance of the spacing at the lower ends of the shades.

In operating the shade construction, either of the two shades, where mounted upon the same roller, may be used, as by manually taking hold of it or as by using a "pull" on it, for controlling the up and down movement of both or the extent to which the multiple shade structure is up or down. The supporting or mounting elements 24 and 25, in the event that the weight of the spaced member 23 is insufficient, are preferably rigid so as to resist upward movement of the spacer member 23 as might be caused when the shades are released for rolling up action, the upward movement of the sheet material having a tendency to drag the spacer member upwardly with it and hence jam the rolling up action unless that tendency is overcome by the weight of the member 23 itself or by rigidity of the suspension members 24 and 25. If the latter are made rigid or inflexible, as when made of wire for example, the screw eyes 26 and 27 form, with suitable eyes 29 (Figures 5 and 6) formed in the upper ends of the wire members, hinge-like connections about the axis of which the spacer member 23 may swing in course of its bodily displacement as above described.

Where made of wire, these suspension elements may be connected to the spacer member 23 in any suitable way as for example in Figure 5, where the member 23 is provided with a hole 23^a at each end through which the end of the wire suspension member is brought, whence the end is bent over as at 26^a and stapled back into the wood of the member 23, thus forming a rigid connection.

Or, by way of further example, the spacer member 23 may have secured at each end a metal screw eye 23^b into which an eye 30 forms, on the lower end of each a wire suspension member is linked, thus forming an articulated connection which coacts with the pivotal supports formed by the screw eyes 26 and 27 to give the spacer member 23 still greater freedom of bodily self-adjustment or displacement in a direction generally parallel to itself. This articulated connection is preferable also for purposes of shipment or packaging, since the wire suspension member can simply be laid over into parallelism against the spacer member itself.

It will be understood that other forms of mounting to permit bodily displacement of the spacer member 23 may be employed if desired and turning now to Figures 7, 8 and 9, I have there shown by way of illustration one such possible other form. I employ the same mounting for the two shades 10 and 11, such as a single roller 15 provided with the supporting pins or studs 16 and 18 as earlier above described and I again employ the spacer member 23, the general assemblage being shown in Figure 7. All of these parts I may assemble and support by means of two companion brackets generally indicated by the reference characters 32 and 33 and shown respectively, in plan views, in Figures 8 and 9.

Bracket supports 32 and 33 may be made of any suitable material, such as sheet metal, and they have plane portions 32^a and 33^a with holes 34 whereby, as shown in Figure 7, they may be placed against the faces of the window frame 12 and by means of nails or screws extending through the holes 34 secured in place.

They may be stamped or shaped to provide portions 32^b and 33^b that are in a plane spaced inwardly from the plane of the portions 32^a and 33^a respectively, as by intermediate webs of metal 32^c and 33^c (better shown in Figure 7), and these portions 32^b and 33^b may be provided with a slot 32^e and a hole 33^e, the latter for first receiving the roller pin 16 and the former for receiving and non-rotatably holding the companion roller stud 18.

At the lower ends of the brackets, they are provided with portions 32^f and 33^f respectively, that are spaced inwardly (see Figure 7) from the plane of the base portions 32^a and 33^a respectively, as by intermediate bends or portions 32^g and 33^g, and in the portions 32^f and 33^f are horizontal slots 35 and 36 respectively.

These slots, when the brackets are mounted in position, extend parallel to each other, and they are of an extent commensurate with the amount of bodily parallel displacement which the spacer member 23 undergoes as was described above in connection with Figures 1–6. The spacer member 23 is of a length to neatly be received between the bracket portions 32^f and 33^f and in its ends it is provided with metal pins or studs 37 and 38 (Figure 7) to be received respectively in the slots 35 and 36.

Under the guidance and influence of the two shade sheets 10 and 11 and under the guidance of the slots 35 and 36, the spacer member 23 adjusts itself by bodily displacement between such extremes as are indicated in Figures 2 and 3 and which were above described in connection with the latter and it will be noted from the general relationships shown in Figures 8 and 9 how the slots 35—36 permit movement of transition of the spacer member 23 as the vertical plane of tangency mentioned above in connection with Figures 2 and 3 shifts as the effective diameter of the roller-cylinder changes. The slots 35 and 36 also prevent movement in an upward direction of the spacer member 23 and thus jamming of the rolling up action does not take place.

It will thus be seen that there has been provided in this invention a construction in which the various objects above mentioned together with many thoroughly practical advantages are successfully achieved. The construction is inexpensive to manufacture, is simple to install and to operate, and is effective in reducing transmission of heat in one direction or the other. In this latter connection higher effectiveness is achieved by proportioning the spacing maintained by the spacer member between the two shades so as to avoid convection currents in the space between the two shades, thus limiting heat transfer to radiation and conduction through the space. Moreover, it will be seen that the construction is well adapted to meet the varying conditions of hard practical use and, moreover, is unobtrusive in appearance and can be installed and used without unsightliness.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawings, it is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding

them apart to provide a space therebetween, and means moveably supporting said spacer means for self-adjustment thereof in a direction generally parallel to itself according to changes in effective diameter of the roller means.

2. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, said spacer means comprising a member extending substantially parallel to said roller means and in proximity thereto and supporting means engaging said spacer means at its respective ends and comprising means providing paths of movement for the ends of said spacer means and hence for said spacer means itself to permit movement of said spacer means substantially parallel to itself in accordance with changes in effective diameter of said roller means.

3. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, said spacer means comprising a member extending substantially parallel to said roller means and in proximity thereto and a pair of link elements having a hinge-like connection with a fixed support for supporting said spacer member at its respective ends for movement in a general direction parallel to itself.

4. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, said spacer means comprising a member extending substantially parallel to said roller means and in proximity thereto and a pair of suspension members connected at their lower ends to the respective ends of said spacer member and supported at their other ends from a fixed support for thereby supporting said spacer member for movement substantially parallel to itself.

5. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, said spacer means comprising a member extending substantially parallel to said roller means and in proximity thereto and a pair of links, one for each end of said spacer member, for moveably supporting the latter, said links having means for hingedly supporting them from a fixed support and having hinge-like connections at their other ends to the respective ends of said spacer member.

6. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, said spacer means comprising a member extending substantially parallel to said roller means and in proximity thereto and a pair of supports for said spacer member for moveably supporting it, the ends of said spacer member and said pair of supports having respective pin and slot connections.

7. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, and means for providing and maintaining a spacing between adjacent shade sheets, irrespective of the effective diameter of the roller means as the said diameter varies according to how many turns of the shade sheets are contained on the roller means.

8. A thermally-insulating window shade construction comprising a plurality of shade sheets having roller means for supporting them in operative relation to a window or the like and for rolling them up or down, spacer means extending between adjacent shade sheets for holding them apart to provide a space therebetween, and means for providing a spacing between the unrolled portions of the shade sheets that is proportioned relative to the thickness of the stationary air film at normal atmospheric pressure and normal temperature as avoids substantial convection currents in the space between the unrolled portions of the sheets.

9. A thermally-insulating window shade construction comprising a single spring-return roller having thereon two shade sheets to be rolled up under the energy stored in the spring-return thereof, spacer means extending between the two shade sheets, means for supporting the roller in a window or the like, and means for supporting said spacer means in position adjacent said roller and for physical self-adjustment according to variations in the effective diameter of the roller and the turns of shade sheets thereabout.

10. A construction as claimed in claim 9 in which the supporting means for the roller comprise two brackets, one for each end of the roller, and the supporting means for the spacer means comprises companion parts of said brackets.

11. A construction as claimed in claim 9 in which the supporting means for said spacer means comprises linkages one at each end of said spacer means.

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