May 10, 1955 F. E. NULL 2,707,993

VERTICAL SLAT BLINDS

Filed Feb. 21, 1952 4 Sheets-Sheet 1

Fig. 1

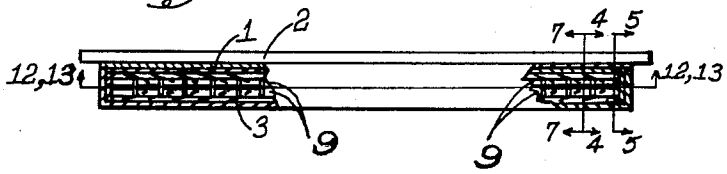


Fig. 4

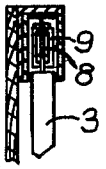


Fig. 2

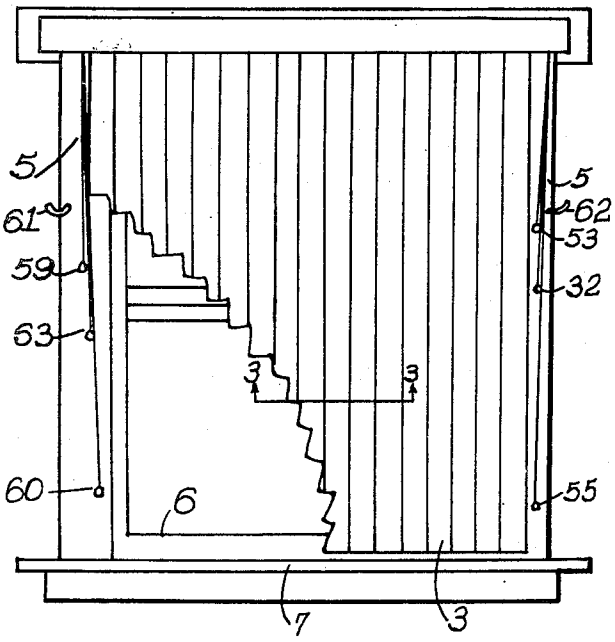


Fig. 5

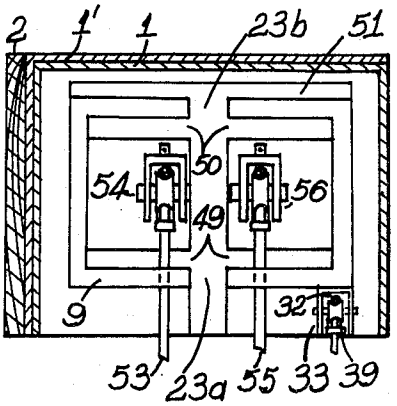


Fig. 3

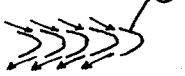


Fig. 10

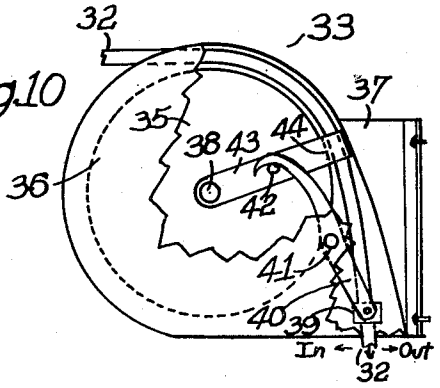
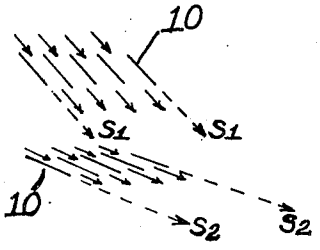


Fig. 6



INVENTOR.

BY Fay E. Null

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VERTICAL SLAT BLINDS

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Fig. 7

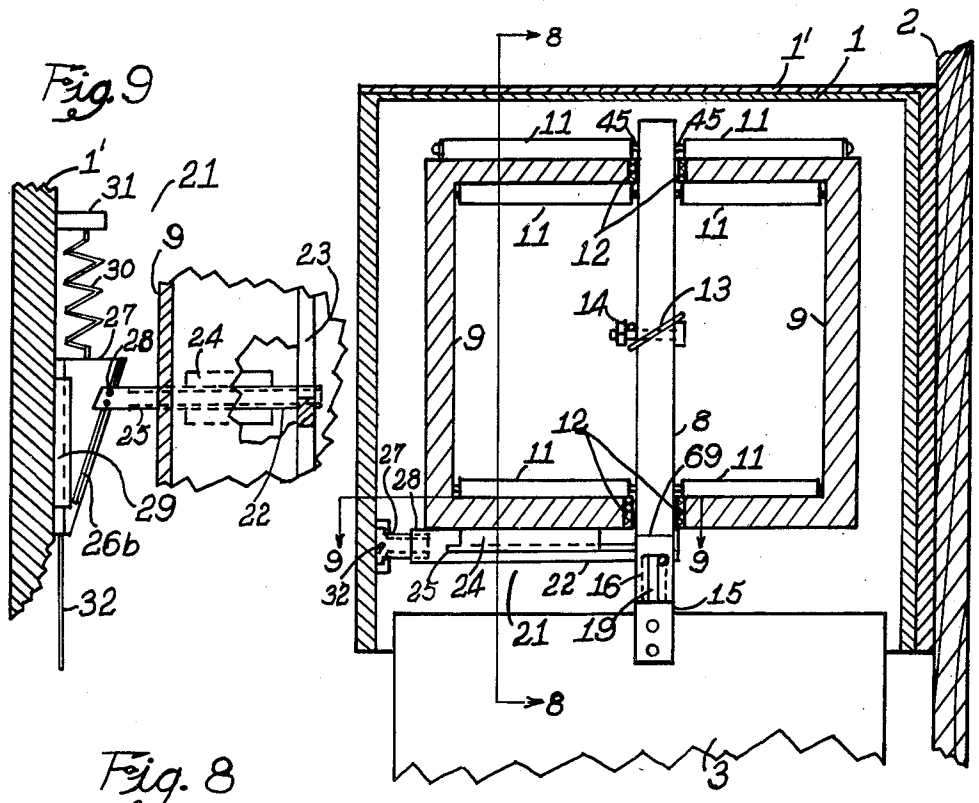


Fig. 9

Fig. 8

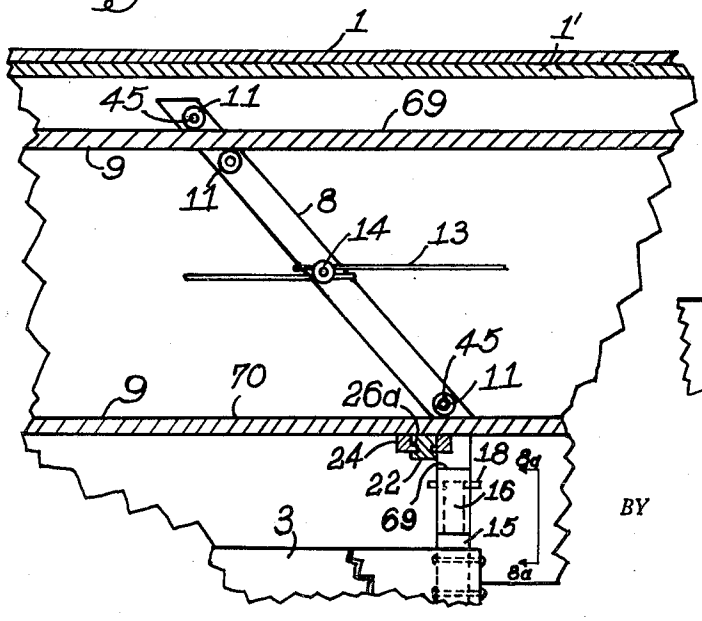
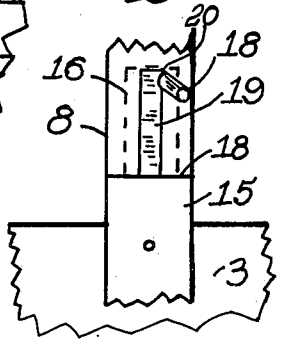


Fig. 8a



INVENTOR.

BY Fay E. Null.

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VERTICAL SLAT BLINDS

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Fig. 11

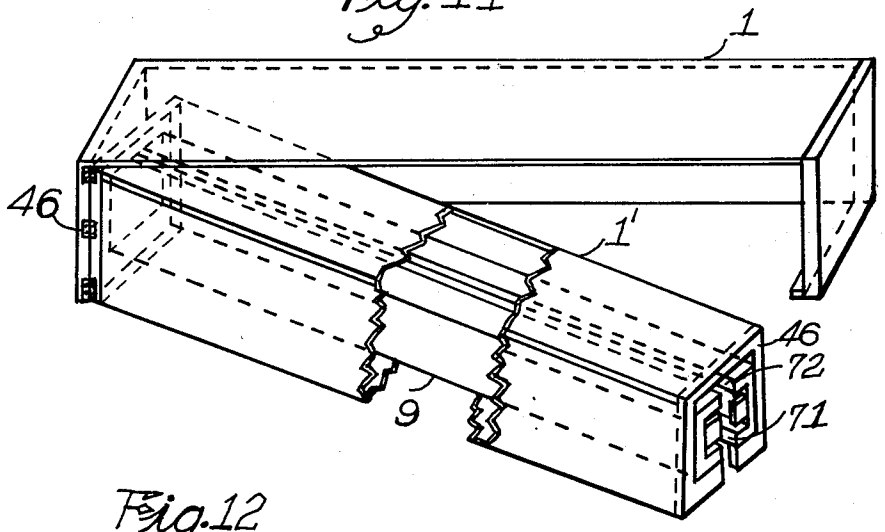


Fig. 12

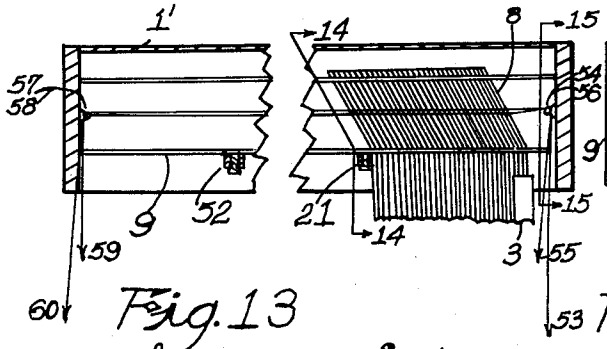


Fig. 14

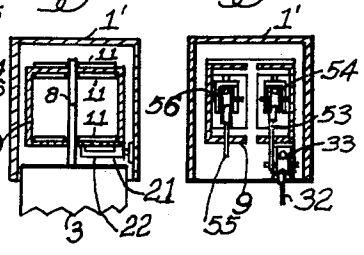


Fig. 15

Fig. 13

Fig. 16

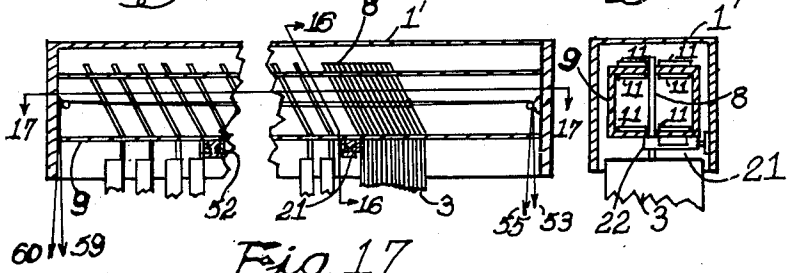
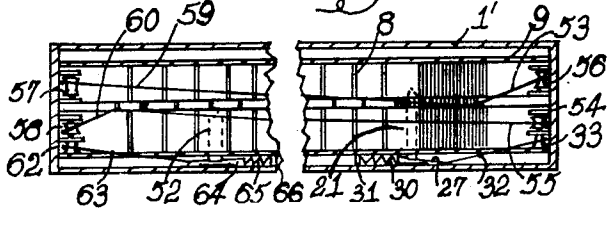


Fig. 17



INVENTOR.

BY Fay E. Null

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VERTICAL SLAT BLINDS

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Fig. 18

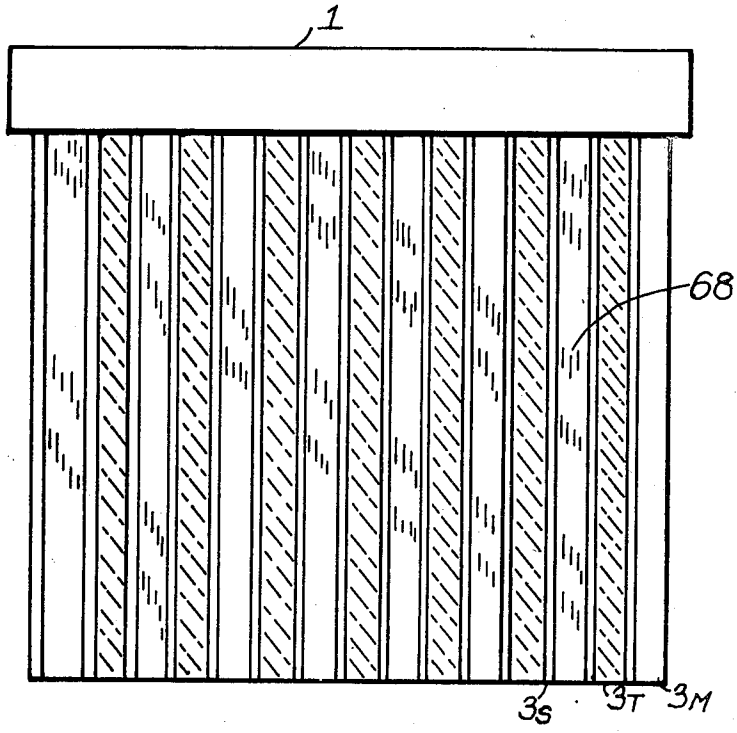


Fig. 19

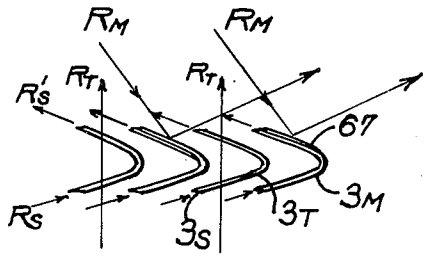
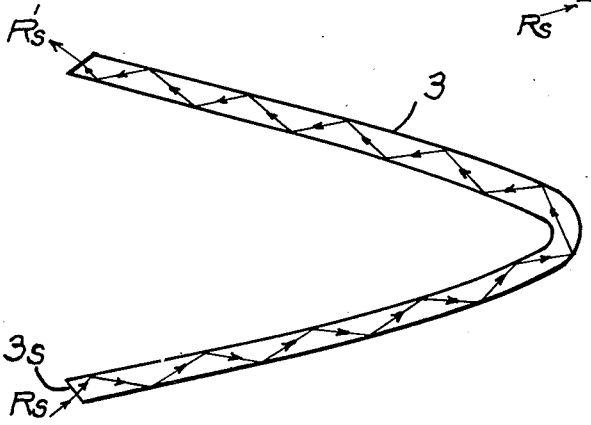


Fig. 20



INVENTOR.

BY Fay E. Null.

United States Patent Office 2,707,993 Patented May 10, 1955

2,707,993

VERTICAL SLAT BLINDS

Fay E. Null, Dayton, Ohio

Application February 21, 1952, Serial No. 272,729

5 Claims. (Cl. 160—168)

It is well known that one of the greatest disadvantages of the horizontal slat Venetian type blind is the difficulty in cleaning the slats and support tapes. Dust and soot readily settle on the horizontal surfaces of the slats. Vertical slats do not have this difficulty as there is little tendency for dust to adhere to a vertical surface. Previous vertical slat blinds have not been satisfactory because of the required loose fit on the upper support to allow the blind to be drawn without binding, and this allows the lower ends of the slats to deflect in a direction parallel to the window sill under the action of wind pressure, producing an unpleasant clatter and exposing the room to view.

It is, therefore, among the objects of the present invention to provide vertical slats to prevent accumulation of dust, supported at the top by a horizontal track engaged by roller members for ease in drawing the blind, said roller members having a shape for ease in nesting but with sufficient moment arms to prevent deflection under wind pressure in directions perpendicular to the slat axes.

Another object of the present invention is to provide slats of parabolic or similarly curved shape so as to provide a maximum amount of clearance between slats for air flow (without vision through the blind) combined with a cross-sectional shape suitable to resist bending torque, so that very light, thin, vertical slats can be used.

Another object of the present invention is to provide ready means for detachment and replacement of individual slats from track carried supports, for cleaning or decorative arrangement of different blended colors to match changes in the room decorative scheme.

Another object of the present invention is to provide elastic connections between slat supports, cord and pulley connections to both ends of the row of slat supports, and track stops, so that any part of the window may be covered at will. This allows nesting of either half of the blind slats, while the other half is stretched apart to allow any desired entrance of light and air and to give sufficient separation between slats for efficient dusting and cleaning.

Another object of the present invention is to provide a track member as part of the blind that will swing outward from the window for removal or replacement of slats or for the removal of the slat supports from the track at infrequent intervals for cleaning.

Another object of the present invention is to provide plastic slats, some of which are aluminized on the surfaces facing the room so as to act as narrow mirrors to give the illusion of space, while others are translucent and impregnated with different color agents. The inner and outer edges of the plastic would be polished to transmit light, and the plastic would have a large index of refraction suitable for internal reflection of the light, so that the light from the outside will issue from the inner edges of the slats through a yellow filtering coat that gives the impression of sunlight even on a cloudy day.

Objects and advantages other than those above set

forth will be apparent to those skilled in the art from the following description when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a plan view of the blind with portions of the top of the frame cut away to show the horizontal track that supports and guides the curved slats.

Fig. 2 is a view in elevation of the blind extended across a window.

Fig. 3 shows a horizontal section along the line **3—3** in Fig. 2.

Fig. 4 is a portion of a vertical section along the line **4—4** in Fig. 1.

Fig. 5 is an enlarged vertical section along the line **5—5** in Fig. 1.

Fig. 6 is a top view of a straight vertical slat blind indicating the angle of exposure of the room interior for different amounts of closure.

Fig. 7 is the enlarged portion of a vertical section along the line **7—7** in Fig. 1.

Fig. 8 is the portion of the vertical section along the line **8—8** in Fig. 7.

Fig. 8*a* is an enlarged view of the pin and slot connector along the line **8***a*—**8***a* in Fig. 8.

Fig. 9 is an enlarged portion of the horizontal section through line **9—9** in Fig. 7.

Fig. 10 is an enlarged view in elevation of one of the pulleys in Fig. 5 with a section of the casing broken away to show the latch levers.

Fig. 11 is a diametric drawing of the frame and hinged track support.

Fig. 12 is a vertical section along the line **12—12** in Fig. 1 but with the slats and carriages nested at the right end of the track.

Fig. 13 is a vertical section through line **13—13** in Fig. 1 but with one section of the slats nested and the other section extended.

Fig. 14 is a vertical section along the line **14—14** in Fig. 12.

Fig. 15 is a vertical section along the line **15—15** in Fig. 12.

Fig. 16 is a vertical section along the line **16—16** in Fig. 13.

Fig. 17 is a vertical section along the line **17—17** in Fig. 13.

Fig. 18 is a view in elevation of a decorative arrangement using alternate mirror and translucent slats with light conducting edges.

Fig. 19 is an enlarged bottom view of a portion of the slats shown in Fig. 18.

Fig. 20 is a schematic diagram of the conduction of a ray of light along a horizontal section of one of the plastic slats of Figs. 18 and 19.

In Fig. 1 the blind frame **1** is supported by the window frame **2**. The curved slats **3** are shown supported from the track **9**.

In Fig. 2 the blind is shown extended across the window frame with a group of three control cords **5** at each end. A portion of the blind is broken away to show that the slat ends extend below the top of the window or screen sash frame **6** but do not reach the window frame **7**.

Fig. 3 illustrates that although vision is completely blocked between the outside and the inside of the window, there is free circulation of air between the curved slats **3**. Fig. 6 shows the action of the straight slats **10** for comparison with that of the curved slats **3** of Fig. 3. When the slats **10** are parallel to the dotted lines s_1 for free access of air, a large field of view back of the blind is exposed. When the slats are parallel to the lines s_2, the exposed field of view back of the blind is still appreciable and the air circulation between the slats has been seriously curtailed. In fact when the field of view is com-

pletely closed no air circulation can occur between the slats.

Fig. 4 shows the slat 3 supported by the carriage 8 rolling on the track 9.

The enlarged vertical sections in Figs. 7 and 8 show end and side views of the slat 3 supported by the carriage 8 which is carried by the rollers 11 guided by the track 9. The body of carriage 8 is bent away from the vertical to provide a lever arm to resist deflection of a slat in a direction parallel to the track without wedging of the rollers 11 between the upper and lower surfaces of the track 9. The ability of the carriages and slats to nest is not affected by the bent carriage. The upper and lower slots 9*a* and 9*b* of the track 9 (see Fig. 5) limit the lateral deflection of the carriages and slats in a direction perpendicular to the track 9. The rollers 11 insure smooth motion of the carriages 8 and may consist of sections of pipe fitted over rods 45 which are press fitted through the body of the carriage 8, for the two lower pairs of rollers. For the top pair of rollers separate rods 45 may be used, one end of each rod being headed to hold a washer, roller tubes slipped over the other ends, and the unheaded end being press fitted into the body of carriage 8. Plastic strips 12 attached to the inside edges of track 9 decrease the sliding friction between the track 9 and carriages 8. The carriages 8 are connected together by the elastic cord 13 secured under the washer of the nut and bolt 14. The top of the curved slat 3 is riveted to the rod 15 whose reduced end 16 has a sliding fit into the slotted and rounded end of the carriage 8. Fig. 8*a* shows the shoulder of rod 15 abutting the end of the carriage, the pin 18 on the end 16 of the rod 15 having been inserted in the slot 19, pushed to the top of the slot and turned to the right to lock into position in the notch 20. Fig. 9 shows an enlarged horizontal section of the carriage stop 21. The bolt 22 is shown blocking the motion of the carriage 8 in the bottom slot 23*a* of the track 9. The guide 24 on the bottom of the track 9 has a tongue 26*a*, Fig. 8, that rides in the groove 25 of the bolt 22. The left end of the bolt 22 in the Figs. 7, 8, and 9, follows the groove 26*b* of the wedge 27 by pins 28, so that it is pushed in or out by a motion of the wedge parallel to the track. The wedge slides in guide 29 supported by the frame 1', the wedge being given a motion parallel to the track by cord 32 pulling against spring 30 attached to pin 31. Thus, by pulling the cord 32 the bolt 22 of the stop 21 is driven between two slat carriages 8, preventing any motion of the slats past that point, and allowing any desired number of slats to be separated from the others and pulled into an extended position with the slats separated by sufficient space for ready cleaning or for the use of the blind to limit the amount of air and sunshine entering rather than to obscure the vision through the window openings. The cord 32 passes over the pulley 33 of Fig. 5, the cord being locked in position by the latch 34. Fig. 10 shows the latch action for all of the pulleys as illustrated for pulley 33. Part of the case 35 held by bracket 37 has been cut away to show the pulley wheel 36 and axle bearing 38. By pulling down and out on cord 32 the cord guide 39 moves the lower end of lever 40 in the out direction as it rotates about bearing 41 and the opposite end presses pin 42 downward causing lever 43 to rotate about bearing 38 in the direction of the cord motion, thus allowing expansion of the flexible cord grip 44, and permitting the cord to readily slide through. When the cord 32 is pulled inward the guide 39 moves the bottom of lever 40 inward, and the top of lever 40 allows pin 42 to rise. If the cord 32 is now released, cord friction against the flexible grip 44 rotates lever 43 upward pinching the flexible cord grip 44 between the pulley wheel 36 and the rim of the case 35, thus preventing motion of the cord 32 in the upward direction when it is pulled inward before release.

Fig. 11 illustrates how the frame 1' is attached by hinges 46 to the main frame 1 so as to readily swing out from the window position into the room. The frame 1' supports the track 9, pulleys such as 33 in Fig. 5, and the track stops such as 21 in Fig. 9. The outswung position of the hinged frame 1' allows the slats 3 to clear the window sill 7 during removal and replacement, the support rod 15 for each slat making a sliding fit (as previously explained for Fig. 8*a*) into the slotted end of the carriage 8, so that the slats can be quickly and conveniently removed for cleaning or rearrangement of the color pattern of the slats. Also the swungout position of Fig. 11, allows complete removal of the carriages through the end 46 of the frame 1' for maintenance or infrequent cleaning. It is only necessary to remove the cords 53 and 55, Fig. 5, and the lower rollers will pass out through openings 49, and the upper rollers through openings 50 and 51 of the end 46.

Fig. 12 is a vertical section showing the nested position of the carriages 8 and slats 3 at the right side of the blind. Neither of the stops 21 or 52 is pushed in to block the travel of carriages 8 on track 9. Fig. 14 shows a vertical section toward the right end. The bolt 22 of stop 21 is not blocking the passage of carriages 8 on track 9. Fig. 15 is an inside end view looking toward the right. Pulleys 54 and 56 respectively guide cords 53 and 55 (see Fig. 17), cord 53 being attached to the right end of the row of carriages and cord 55 to the left end of the row of carriages. On the left end of the blind pulleys 57 and 58 respectively guide cords 59 and 60, cord 59 being attached to the right end of the column of carriages and cord 60 to the left end of the column of carriages. To nest the slats and carriages at the right end of the track 9 it is only necessary to place the cords 59 and 60 at the left end of the blind behind hook 61, Fig. 1, so that the pulleys 57 and 58 will not lock but will allow the cords 59 and 60 to pass to the right, and then to pull on cord 53 attached to the right end of the row of elastically connected carriages 8, and to pull on cord 55 attached to the left end of the row of carriages 8 to nest them compactly at the right end of frame 1'. If the elastic connections 13 were depended upon to nest the carriages 8 compactly, they would have to be under undue tension for the slats 3 in the normal position in Fig. 3, and the life of the elastic cord 13, Fig. 7, would be decreased. Nesting at the other end of the frame 1' is accomplished in a similar manner, cord 59 being attached to the right end and cord 60 to the left end of the row of carriages 8 carrying slats 3.

Fig. 13 shows a portion of the carriages 8 and slats 3 nested at the right end of the frame 1' and the others pulled along the track 9 and separated the desired amount for dusting or to only partially limit the entrance of light and/or circulation of air when it is not necessary to obstruct the view of the room from the outside. For the sun's rays at less than 90° to the direction of the track 9, the slats 3 can be separated for outward vision without entrance of the sun's rays. Cord 60 is pulled to the left until the desired number of carriages 8 have passed to the left of the stop 21, and cord 32 is pulled down extending bolt 22 of stop 21 in Fig. 16 across the path of the carriages 8 to the right of the stop and the cord 32 is pulled to the left locking pulley 33 so that the stop 21 is held in the closed position against the tension of spring 30, Fig. 9. Cord 30 is now pulled until the carriages 8 to the left of stop 21 have been separated the desired amount, the cord then being held down and in (to the right) so that the pulley 58 locks the cord 60 in position. A similar procedure can be followed at the left end of the frame 1' (if the slats 3 are originally nested at that end) by means of stop 52, pulley 62, Fig. 17, and cord 63 attached to the end of wedge 64 connected to spring 65 and pin 66, in a duplicate arrangement of that for stop 21 at the right hand end of the track 9 and supporting frame 1', with cord 53 at the right end of track 9 being pulled to separate the slats to the right of stop 52.

Fig. 8 presents an attractive and decorative scheme.

The slats 3_M are constructed of plastic and as shown in the enlarged partial bottom view of Fig. 19, are coated over the portion seen from the inside of the room with a metallic deposit such as evaporated aluminum and polished to mirror luster. This causes ray's R_m from the room to be reflected from the curved mirror surface **67** to form a panel image of the room interior. The slat 3_T is made of the same plastic without the mirror deposit and is colored to give a translucent admission to the room of rays such as R_T, replaceable slats of the desired color blends being selected to match the color scheme selected by the house wife. The plastic material for the slats has a high index of refraction so that rays from the out-of-doors incident upon the beveled ends 3_S, Fig. 20, as an enlarged end view of a slat in Fig. 19, can make a considerable angle to the slat wall and still be guided by internal reflections to the inside edge of the slat, there to issue into the room as rays R's. The decorative result in the daytime is a series of panel mirrors, 3_M reflecting views of the room and giving the illusion of increased depth and space, separated by translucent panels 3_T that glow with blended colors, and each panel edge 3_S being accented with a bright border that appears to transmit sunlight even in cloudy weather. At night the highlights of the room are reflected from the mirrors in trails of light **68**, and the outward appearance is given a pleasant warmth through the colored translucent slats 3_T and the beveled slat edges 3_S appear as bright stripes. The translucent light passes through two thicknesses of curved slat and is effectually diffused. Silhouette shadows against the blind are broken up by the mirrors so that their outline is lost. Slats with widely different translucent properties can be readily interchanged by slipping the slats on and off of the carriages **8**.

I claim:

1. In a vertical slat blind, the combination of, vertical slats with curved cross-sections, a horizontal track, support and guide means on said track for said slats, elastic connections between said slat support means, stops that block said track in their closed position with separation of said slats into a nested portion and an extended portion, said extended portion having sufficient separation for dusting or reduction of sunlight without entire obstruction of vision.

2. In a vertical slat blind, a horizontal track with an upper and lower runway, rigid carriage members extending through slots in said runways at an angle of inclination to said runways to prevent binding and still allow nesting, rolling means engaging said carriages with said runways, and attachment means between said carriages and the vertical slats of said blinds that are rigid with regard to the oscillation of the axes of said slats in directions either parallel or perpendicular to said track, to prevent clanging and impact of the slats against each other, the window sill, and surrounding objects when subjected to wind gust load.

3. In a vertical slat blind, the combination of, a track and slat carriage assembly that prevents oscillation of the carriage vertical axes under wind gust load on the attached slats, with a slidable attachment means between said slats and said carriages that allows ready removal of individual slats for cleaning and blending of color patterns without oscillation of the slats in directions either parallel or perpendicular to said track, said track and carriage assembly comprised by a horizontal track with an upper and lower runway, rigid carriage members extending through slots in said runways at an angle of inclination to said runways to prevent binding but still allow nesting, rolling means engaging said carriages and said runways so that clanging and impact of said slats against each other, the window frame, and surrounding objects is prevented but the individual slats are readily removable for cleaning or color pattern blending by the housewife.

4. In a vertical slat blind, the combination of, a track and carriage ensemble that prevents oscillation of the carriage vertical axes under wind gust load on the attached slats, with slidable attachment means between said slats and said carriages that allows ready removal of individual slats for cleaning and blending of color patterns without oscillations of the slats in directions either perpendicular or parallel to said track, and a track mounting with vertical hinge means about which said track may be swung outward to allow complete removal of said slats and carriage ensemble for cleaning without interference from the window frame or sill, said track and carriage ensembled being comprised by a horizontal track with an upper and lower runway, rigid carriage members extending through slots in said runways at an angle of inclination to said runways to prevent binding but still allow carriage nesting, and rolling means that engages said carriages and said runways.

5. In a vertical slat blind, the combination of plastic slats with a high index of refraction to favor internal reflection of light, bevelled edges on the sides of said slats that allow more light to enter the slat edges at angles at which internal reflection can occur so that light is funnelled through said slats and the inside edges appear as light sources even on a cloudy day, and slidable attachment means between each slat and a carriage on a horizontal track, and hinge means for swinging the track free of the window frame and sill, for maximum ease in replacement and interchange of said slats in artistic color patterns and slat edge, light source arrangements.

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