

June 22, 1965

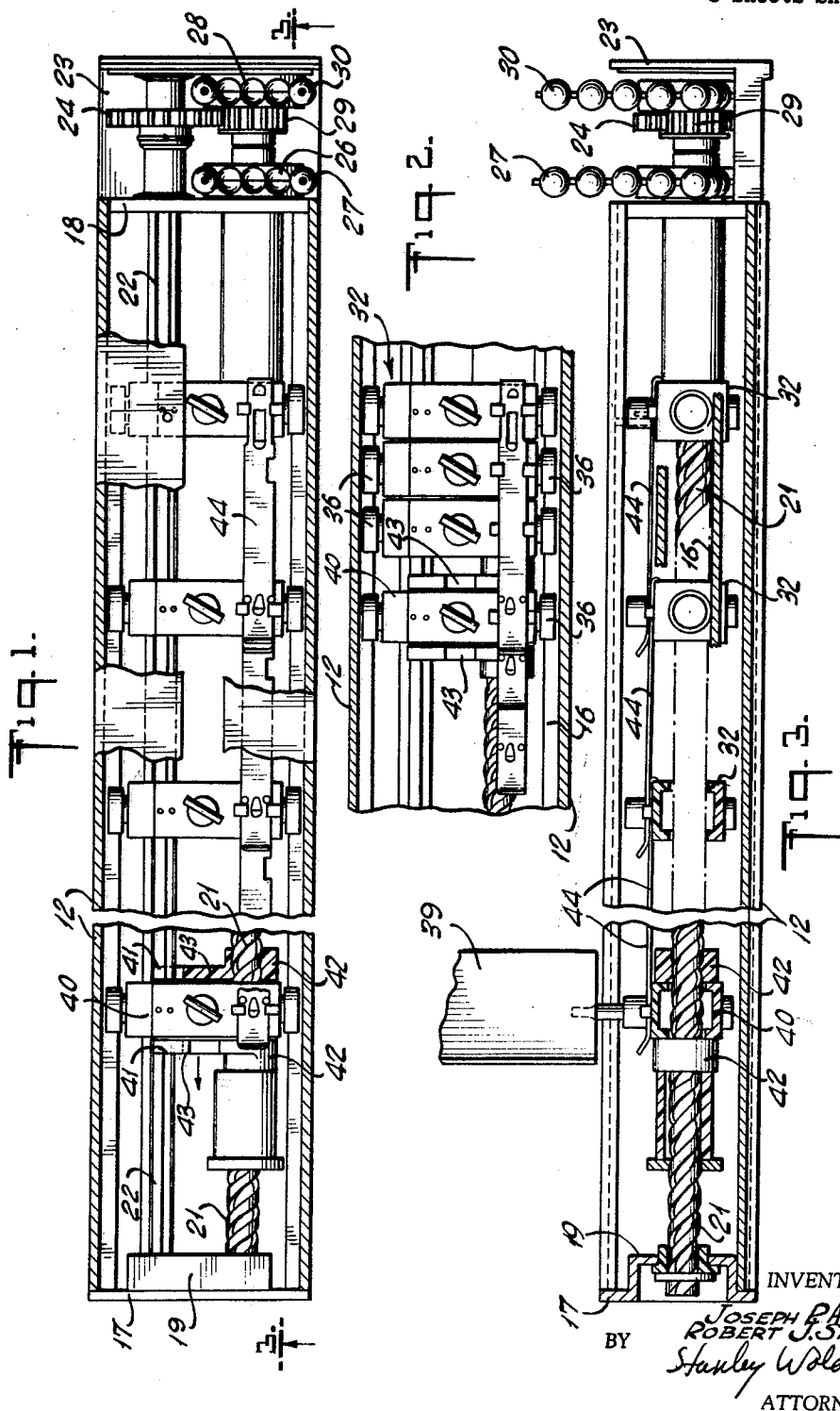
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3,190,346

VERTICAL VANE TRAVERSE MECHANISM

Filed Nov. 21, 1962

3 Sheets-Sheet 1



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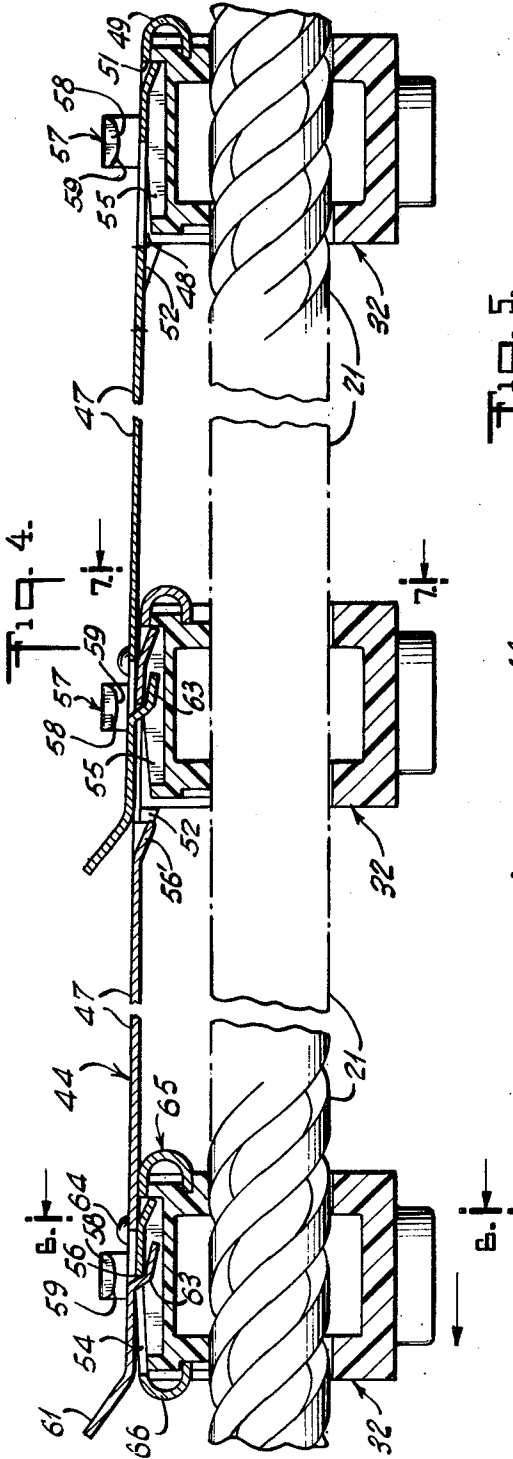
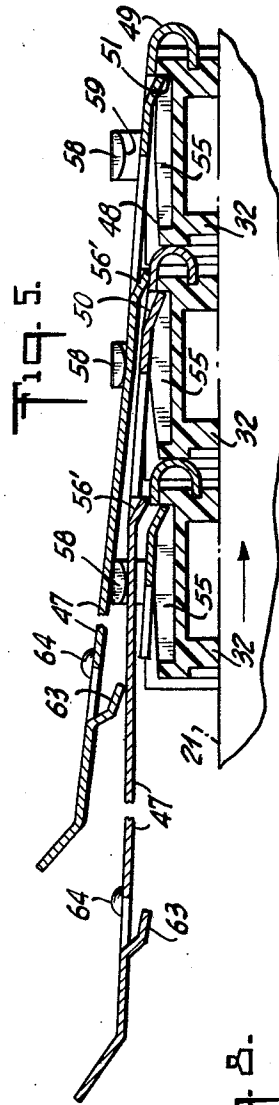
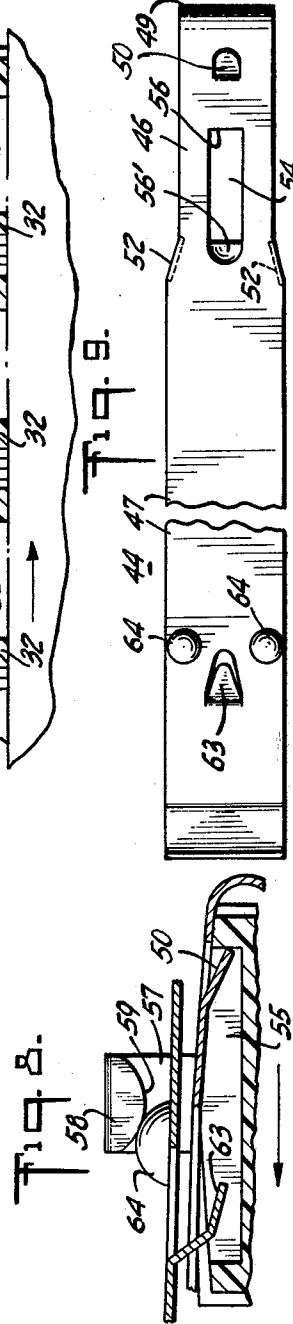
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3,190,346

VERTICAL VANE TRAVERSE MECHANISM

Filed Nov. 21, 1962

3 Sheets-Sheet 2



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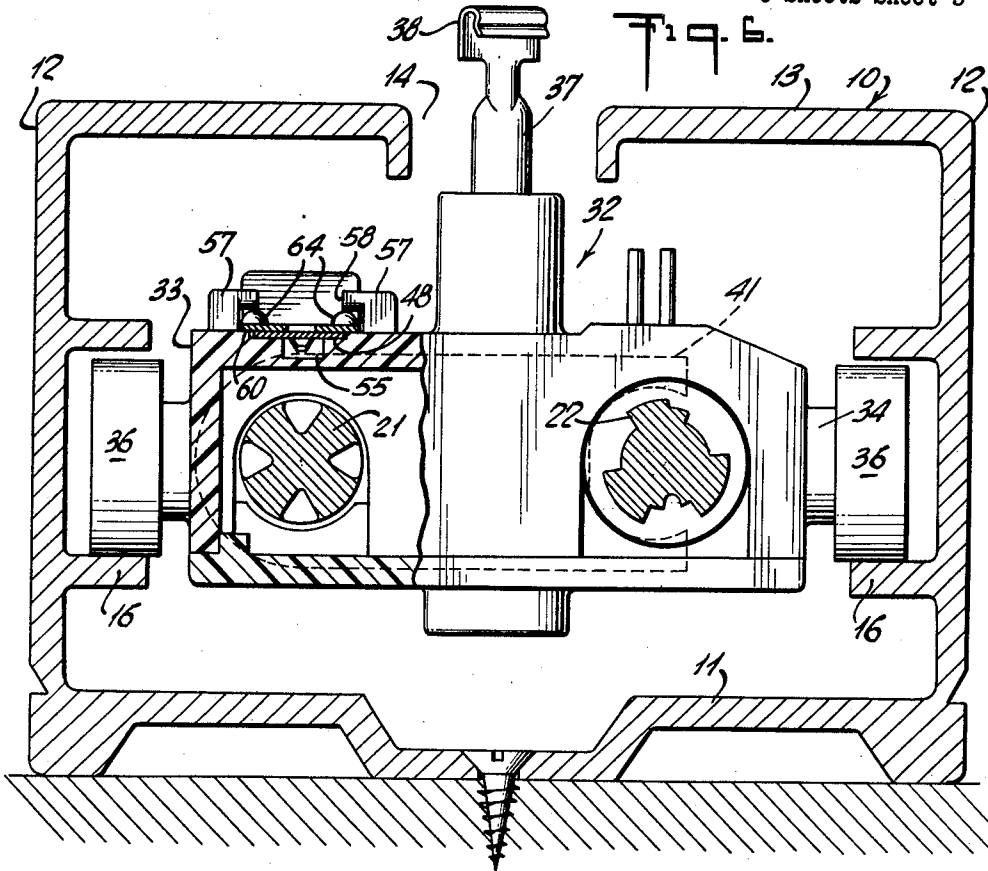
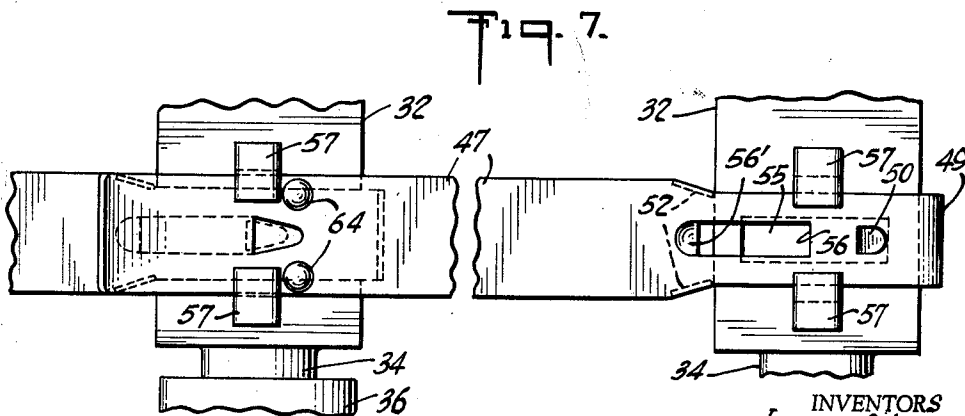
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VERTICAL VANE TRAVERSE MECHANISM

Filed Nov. 21, 1962

3 Sheets-Sheet 3



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3,190,346

VERTICAL VANE TRAVERSE MECHANISM

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Filed Nov. 21, 1962, Ser. No. 239,204

9 Claims. (Cl. 160—172)

The present invention relates generally to improvements in vertical vane blind structures and it relates more particularly to improvements in vertical vane traverse mechanisms.

A vertical vane blind in general use includes upper and lower parallel track members or a single track member along which traverse corresponding pairs of carriers tightly supporting respective vertical slats or vanes. Associated with one or both of the tracks is a longitudinally extending threaded rod and a longitudinally extending splined rod which register with longitudinal bores in the carriers. The splined rod is rotatable and is coupled to translating mechanisms in the carriers to control the tilt of the vanes about vertical axes and the threaded rod which defines a traverse control member engages a follower member which is connected to the leading carrier to longitudinally effect the advance and retraction thereof. The lead carrier in turn is connected to the trailing carriers so that advance and retraction of the lead carrier effects the extension and contraction of the blind. The vane traverse control mechanisms heretofore employed in vertical vane blinds of the above type possess numerous drawbacks and disadvantages. They are difficult to operate, are subject to frequent binding and other malfunctioning and otherwise leave much to be desired.

It is, therefore, a principal object of the present invention to provide an improved vertical vane blind structure.

Another object of the present invention is to provide an improved vane traverse mechanism for vertical vane blinds.

Still another object of the present invention is to provide an improved vertical vane blind traversing mechanism wherein the vane carriers are advanced and retracted along support tracks in which binding and malfunctioning of the vane carriers are eliminated.

A further object of the present invention is to provide a vertical vane traverse mechanism of the above nature characterized by its ruggedness, simplicity, reliability and ease of operation, and low cost.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing wherein:

FIGURE 1 is a top plan fragmentary view of a vane traverse mechanism in a vertical vane blind embodying the present invention, the vane carriers being illustrated in fully extended position;

FIGURE 2 is a fragmentary view similar to FIGURE 1, the vane carriers being illustrated in their retracted positions;

FIGURE 3 is a sectional view taken along line 3—3 in FIGURE 1;

FIGURE 4 is an enlarged detailed fragmentary view taken along line 3—3 in FIGURE 1;

FIGURE 5 is a view similar to FIGURE 1, the carriers being illustrated in retracted positions;

FIGURE 6 is an enlarged sectional view taken along line 6—6 in FIGURE 4;

FIGURE 7 is a fragmentary enlarged top plan view of a pair of successive vane carriers in extended positions;

FIGURE 8 is an enlarged fragmentary sectional view of a carrier illustrating a pair of spacer links being extended toward their coupled position; and

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FIGURE 9 is a fragmentary top plan view of a spacer link.

In a sense, the present invention contemplates the provision of a vertical vane blind comprising a plurality of carriers relatively longitudinally movable between a contracted and expanded position, a link having a trailing section connected to each of said carriers and extending longitudinally into movable overlapping relationship with the next successive link, and mating separable interlocking means disposed on and adjacent opposite ends of each of said links, said interlocking means on successive links being urged into engagement when the respective trailing and leading sections thereof are in registry.

According to a preferred form of the present invention, there is provided a longitudinally extending track along which the carriers are slidably guided and a pair of transversely spaced longitudinally extending rods extend parallel to the track, one of these rods being threaded and defining a traverse control rod and the other rod being of uniform non-circular transverse, cross-section and defining a vane angle control rod. Each of the carriers consists of a housing having transversely spaced bores formed therein which register with the control rods. One of the bores has journaled therein a worm gear slidably engaging the angle control rod and rotatable therewith and the other bore slidably engages the threaded traverse rod. A gear is medially housed in each carrier and is rotatable about a vertical axis by a corresponding engaging worm gear and is connected to a vane coupling member to permit the synchronized angular adjustment of the vanes by rotation of the angle control rod. Follower members are associated with the lead carrier and engage the threaded rod so that rotation thereof advances or retracts the lead carrier. A spacer link formed of flexible resilient material has a trailing end substantially rigidly affixed to each of the carriers and projects longitudinally thereof parallel to and in vertical alignment with the traverse control rod. The link trailing section has a longitudinal slot formed therein and the leading section has a hook shaped element formed in one face and an oppositely directed detent on the other face. Guide members are located on each carrier to retain each of the spacer links in confronting vertical registry with the trailing end of the next successive leading link and to urge the hook member of one link into engagement with the slot shoulder of the next successive leading link when adjacent carriers are moved to their relatively expanded positions.

The advantages of the unique traverse mechanism described above are manifold. The carriers may be traversed with a minimum of effort and binding is eliminated. Further, the carriers can be of very small thickness and in their contracted state are in substantially abutting relationship. Furthermore, the spacer link arrangement is such that the pull on the trailing carriers is transmitted solely through the spacer links and the carriers do not function as couplings between links. Moreover, since there is no connection between the links in their uncoupled state the retraction procedure of carriers is greatly improved. In addition, by reason of the overall assembly, full accessibility to the various components is readily afforded.

Referring now to the drawing which illustrates a preferred embodiment of the present invention, the reference numeral 10 generally designates a channel shaped horizontal longitudinally extending guide member, suitably affixed along the bottom of a window or other opening, it being noted that a similar guide member, in inverted position, is similarly affixed along the top of the window opening and provided with a corresponding traverse and control mechanism. The guide member 10 includes a base wall 11 and parallel vertical side walls 12 terminating in inwardly directed flanges 13 provided at their free

ends with parallel lips delineating a medial longitudinally extending slot 14. Formed on the inner face of each of the side walls 12 is a track defining pair of inwardly directed parallel longitudinally extending flanges 16 located between the upper and lower side wall edges.

Located at opposite ends of the guide member 10 are plates 17 and 18 respectively, the plate 17 supporting a journal block 19 and the block 20 having a pair of transversely spaced openings formed therein. A vane traverse control worm or rod 21 having multiple threads formed therein extends along the length of the guide member 10 transversely offset relative to its medial axis and at the level of the track 16, one end of the worm 21 being journaled in the block 19 and the other end projecting through the end plate 18. Similarly, a splined vane angle control rod or shaft 22 at the level of and offset oppositely relative to the worm 21 has one end journaled in the block 19 and its opposite end projecting through the end plate 18. A gear box or bracket 23 is mounted on the guide member 10 outside the plate 18 and houses a first gear 24 affixed to the splined shaft 22 and is longitudinally positioned by suitable spacers. A sprocket wheel 26 is affixed to the free end of the worm 21 adjacent to the end plate 18 and is engaged by a sprocket ball chain 27 which also engages a corresponding sprocket wheel on the opposite guide member. A second sprocket wheel 28 has a spur gear 29 affixed thereto and engaging the gear 24, the sprocket wheel 28 and gear 29 being journaled coaxial with the worm 21 and the sprocket wheel 28 being engaged by a ball chain 30 which engages a corresponding sprocket wheel of an opposite guide member.

A plurality of vane carriers 32 is disposed in the guide member 10 and may have its counterpart in an opposite guide member. Each carrier includes a housing 33 having transversely spaced longitudinally extending bores registering with the worm 21 and splined shaft 22 and provided with transversely projecting stub axles 34. Mounted in each of the axles 34 is a wheel 36 which engages a corresponding track 16 to facilitate the longitudinal movement of the carriers 32. Located in each of the housings 33 is a medially located vertically extending gear, not shown, which is connected to an axial shaft 37 projecting through the slot 14 and terminating in a coupling member 38 engaging an end of a corresponding blind vane 39. Also journaled in each housing 33 is a longitudinally extending worm slidably engaging and rotatable with the shaft 22 and meshing with the gear carrying the shaft 37 so that rotation of the shaft 22 turns the shafts 37 whereby to synchronously turn the vanes 39.

Disposed along opposite sides of the lead carrier 40 which is similar in structure and function to the carriers 32 is a pair of pusher members 41. Each of the pusher members 41 includes a follower defining internally threaded hub member 42 which engages the worm 21. Projecting transversely from each of the followers 42 is an arm 43 terminating in a forked yoke which slidably engages the splined shaft 22. Thus rotation of the worm 21 is one or the other directions advances and retracts the followers 41 which in turn advances and retracts the lead carrier 40.

In order to effect the advance and retraction of the trailing carriers 32 and to accurately space these in their extended positions there is provided a plurality of spacer links 44 anchored to each of the carriers 32. Each spacer link 44 is formed of a longitudinally extending band of a resilient flexible material such as a spring steel having a trailing end section 46 of appreciably lesser width than the remaining leading section 47. Each link 44 is substantially rigidly anchored at its trailing end to a corresponding carrier at a point in vertical alignment with the worm 21 and extends along a longitudinal direction parallel to the worm 21 but having its leading end vertically swingable relative thereto by reason of the resiliency of the link.

Formed in the top face of each carrier 32 in vertical parallel alignment with the worm 21 is a longitudinally extending shallow groove 48 of substantially the width of the link section 46. The link trailing section 46 tightly engages the groove 48 and is provided with a depending hooked end 49 having a forwardly directed leg engaging a matching recess formed in the trailing face of the housing 33. Formed in trailing section 46 forwardly of the hook 49 is a rearwardly downwardly inclined tongue 50, the free end of which engages the trailing shoulder 51 of a longitudinally extending medial well 55 formed in the base of the groove 48. The edges of link sections 46 and 47 are joined by inclined edges from which depend lugs 52 engaging the leading faces of the housings 33.

A longitudinally extending medial slot 54 is formed in the link trailing section 46 and terminates at its trailing end in a transverse shoulder 56 located longitudinally intermediate the housing front and rear ends and is provided at its leading end, forward of the housing 33, with a downwardly rearwardly directed concavity 56'. A pair of transversely spaced posts 57 are located on the top face of the housing 33 on opposite sides of the groove 48 and spaced outwardly of the side edges thereof, the distance between the confronting faces of the posts 57 being somewhat greater than the width of the link leading section 47 and said faces preferably being slightly convex. The posts 57 terminate at their tops in arms 58 directed transversely toward each other and spaced above the housing top face. The inner ends of the arms 58 are separated a distance less than the width of the link section 47 and are provided with convex cam defining underfaces 59. It should be noted that the arms 58 may be joined to form an integral bridge.

The leading section 47 of each of the links 44 is located in the passageway 60 of the next successive leading carrier 32 delineated by the confronting faces of the posts 57, the arm underfaces 59 and the top face of the next succeeding link trailing section 46 and the border of the top face of the housing 33. The link leading section 47 is longitudinally freely movable in the passageway 60 and is subject to a restricted vertical movement. Each of the link leading sections 47 terminate in an upwardly forwardly inclined arm 61, trailing which is medially located a rearwardly directed depending coupling hook defining angulated tongue 63 formed integral with the link 44. A pair of transversely spaced upwardly directed detents or bosses 64 are disposed along opposite side edges of the link 44 immediately trailing the coupling hook 63. The overall height of the boss 64 and the hook 63 is greater than that of the passageway 60 and the height of the boss 64 and is less than the passageway height.

The leading carrier 40 has anchored thereto a coupling section 65 similar in construction to link trailing section 46 and differing therefrom primarily in the absence of the leading section 47 and the provision of a depending leading hook section 66 engaging a mating recess in the leading face of the carrier 40. In all other respects its association with the carrier 40 is similar to that of a link trailing section 46 with a carrier 32.

Considering now the operation of the traverse mechanism described above, in its contracted state the carriers 32 and 40 are in the positions illustrated in FIGURE 2. Upon rotation of the sprocket wheel 27 and worm 21 in an advancing sense, counterclockwise as viewed in FIGURE 6, the pushers 41 are advanced to the left, the trailing pusher 41 advancing the leading carrier 40 with the supported vane. The carrier 40 moves along the length of the next trailing link 44 whose leading section registers with the passageway 60 of the carrier 40. As the slot 54 is carried into registry with the coupling hook 63 and the bosses 64 are brought into engagement with the cam faces 59 the coupling hook is urged into engagement with the shoulder 56. Further advance of the lead carrier 40 advances the engaged link 44 which pulls the

next successive carrier 32 until the shoulder 56 of the link anchored thereto engages the coupling hook 63 of the next successive link. Thus as the lead carrier 40 is advanced successive carriers are sequentially advanced and accurately spaced from the preceding carrier a distance determined by the length of the spacer link. Moreover all of the carriers are advanced by the lead carrier through the extensible link chain, none of the pulling stress being transmitted through any of the trailing carriers.

In collapsing the blind, the worm 21 is rotated by the sprocket wheel 27 in a clockwise direction and the lead pusher 41 bears on the lead carrier 40 to transport it to the right. The lead carrier shoulder 56 moves out of engagement with the mating hook 63, the cam surfaces 59 move past the trailing side of the bosses 64 and the hook 63 is urged out of registry with the slot 54 by the concavity 56' bearing on the underface of the hook 63. As the lead carrier 40 and pushers 41 are further retracted they bear upon the first trailing carrier 32 to urge it to the right, the hook member 63 of the link anchored to the next trailing carrier being disengaged from the shoulder 56 and slot 54 of the first trailing carrier in the manner described above. As the first trailing carrier moves towards the next trailing carrier the trailing link rides over the post arms 58 as best seen in FIGURE 5. Upon full retraction of the lead carrier the carriers are compactly contracted to the position illustrated in FIGURE 2.

Inasmuch as the splines on the shaft 22 extend linearly, movement of the carriers 32 do not effect any rotation of the vane shafts 37. The vane shafts 37 may be synchronously adjusted merely by rotating the shaft 22 by way of gears 24 and 29 and sprocket wheel 30.

While there has been described and illustrated a preferred embodiment of the present invention it is apparent that numerous alternations and omissions may be made without departing from the spirit thereof.

What is claimed is:

1. A vertical vane blind comprising a plurality of carriers relatively longitudinally movable between a contracted and expanded position, a substantially similar link having a trailing end section connected to each of said carriers and a leading end section and extending longitudinally into longitudinally movable overlapping relationship with the next successive link, mating separable interlocking means disposed on said trailing and leading end sections of each of said links, a first detent located on each of said carriers and spaced from and directed toward a face of the link trailing end section secured to the respective carrier, and a second detent located on a face of the leading end section of each of said links and in longitudinal alignment with said first detents and directly oppositely to said first detents, at least one of each of said first and second detents having an inclined cam defining surface whereby said interlocking means on successive links are urged into engagement when the respective trailing and leading end sections thereof are in registry.

2. The vertical vane blind of claim 1, wherein each of said links is formed of a flexible resilient band.

3. The vertical vane blind of claim 2 wherein said separable interlocking means includes a hook member projecting from a surface of each of said links toward the confronting surface of the next successive link and engages a shoulder formed in said next successive link when the re-

spective trailing and leading end sections thereof are in registry.

4. The vertical vane blind of claim 1 including means on each of said carriers slidably engaging the link connected to the next preceding carrier and restricting the transverse movement thereof.

5. A vertical vane blind comprising a plurality of longitudinally spaced vane carriers having transversely spaced pairs of first and second longitudinal bores formed therein, a longitudinally extending worm registering with said first bores, a longitudinally extending vane angle control shaft registering with said second bores, a follower member engaging said worm and cooperating with a leading of said carriers, a spacer link having a trailing section affixed to each of said carriers and having a leading section projecting from said carrier along a direction in parallel vertical alignment with said worm, means located on each of said carriers guiding said next successive link leading sections for movement in overlapping relation with the respective link trailing sections, separable mating coupling means located adjacent opposite ends of each of said links, a first detent located on each of said carriers and spaced from and directed toward a face of the link trailing end section secured to the respective carrier, and a second detent located on a face of the leading end section of each of said links and in longitudinal alignment with said first detents and directed oppositely to said first detents, at least one of each of said first and second detents having an inclined cam defining surface whereby to urge the coupling means on successive links into separable engagement when brought into registry.

6. The vertical vane blind of claim 5 wherein said coupling means includes a hook and a shoulder formed on each of said links.

7. The vertical vane blind of claim 5 including a pair of posts mounted on each carrier along opposite sides of adjacent links, and inwardly directed legs defining said first detents located on each of said posts to delineate with said posts a guide passageway for the leading section of the next successive link.

8. The vertical vane blind of claim 1, including means on each of said carriers defining first and second non-coinciding guides, said first guide engaging a link trailing end section and second guide slideably engaging a link leading end section.

9. The vertical vane blind of claim 1, including means on the trailing end section of each of said links engaging the trailing portion of a corresponding carrier, said trailing end section being provided with a detent member engaging the leading face of said corresponding carrier relative to said respective link to restrict the longitudinal movement of said link relative to said carrier and being vertically movable relative to said carrier.

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