

Oct. 25, 1960

P. J. HOWARD
VENETIAN BLIND

2,957,520

Filed Aug. 4, 1958

5 Sheets-Sheet 1

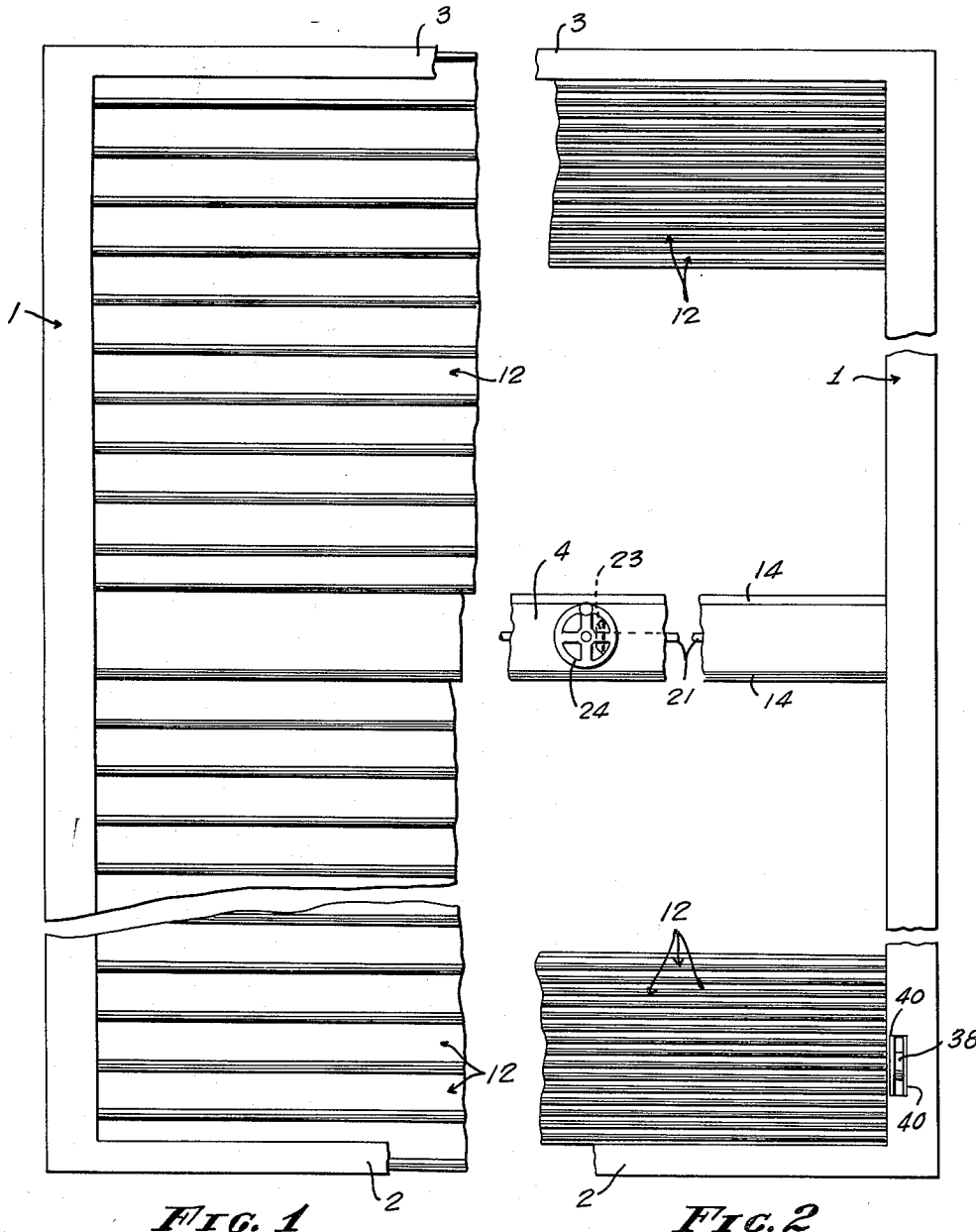


FIG. 1

FIG. 2

INVENTOR.
PAUL J. HOWARD
BY *Lyon & Lyon*
ATTORNEYS

Oct. 25, 1960

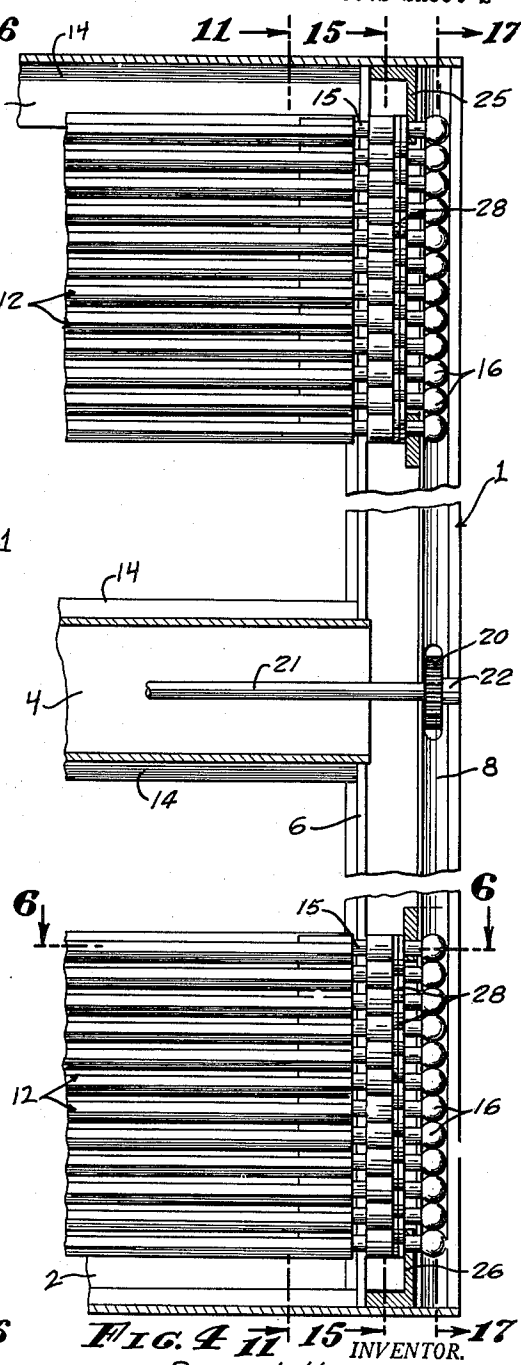
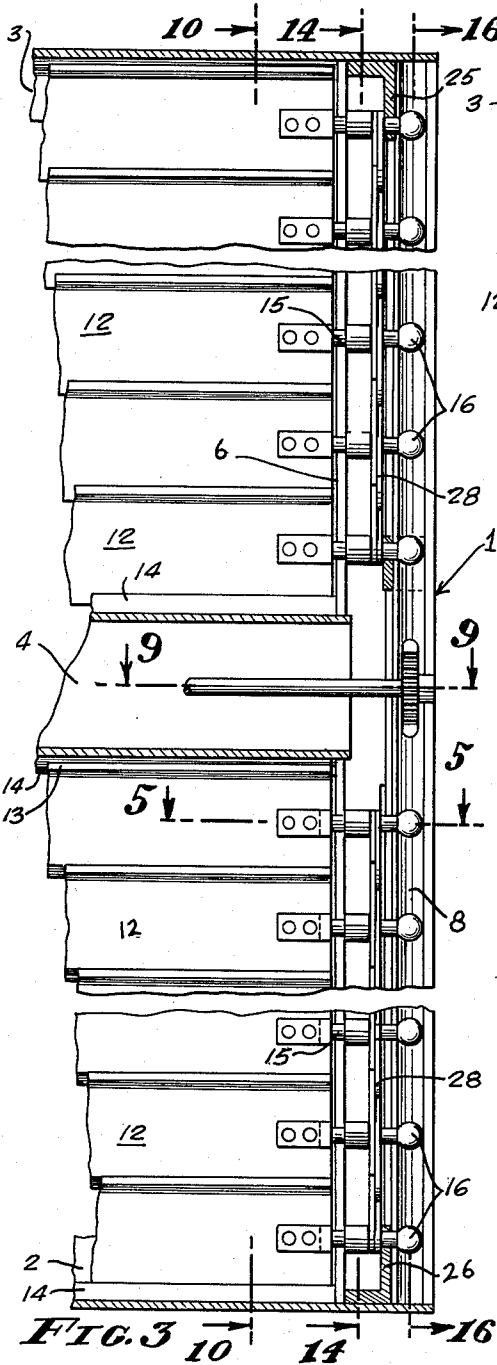
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5 Sheets-Sheet 2



INVENTOR.
PAUL J. HOWARD
BY *Lyon & Lyon*
ATTORNEYS

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P. J. HOWARD

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5 Sheets-Sheet 3

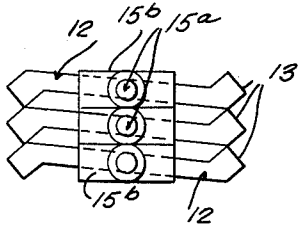


FIG. 18

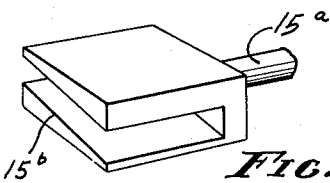


FIG. 19

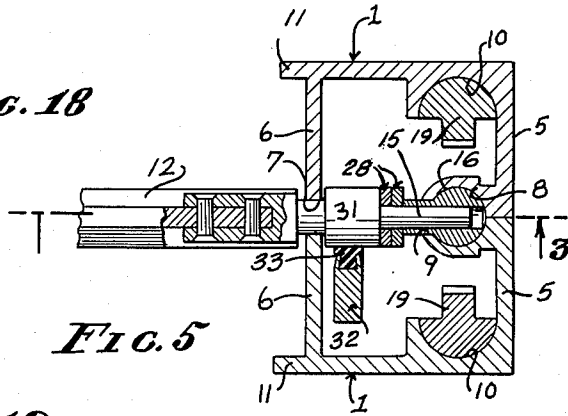


FIG. 5

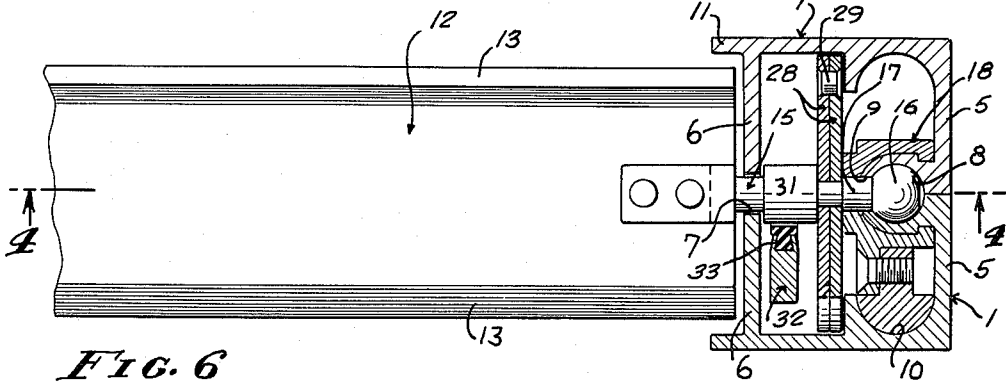


FIG. 6

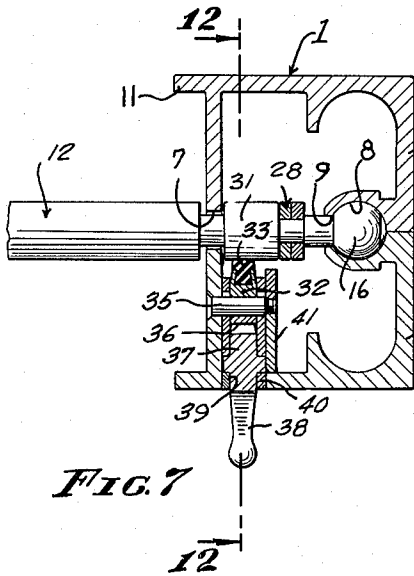


FIG. 7

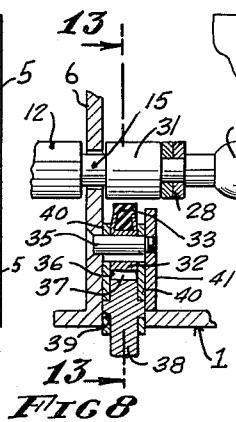


FIG. 8

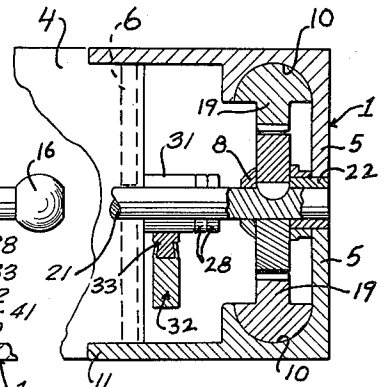


FIG. 9

INVENTOR.
PAUL J. HOWARD
BY
Lyons & Lyson
ATTORNEYS

Oct. 25, 1960

P. J. HOWARD
VENETIAN BLIND

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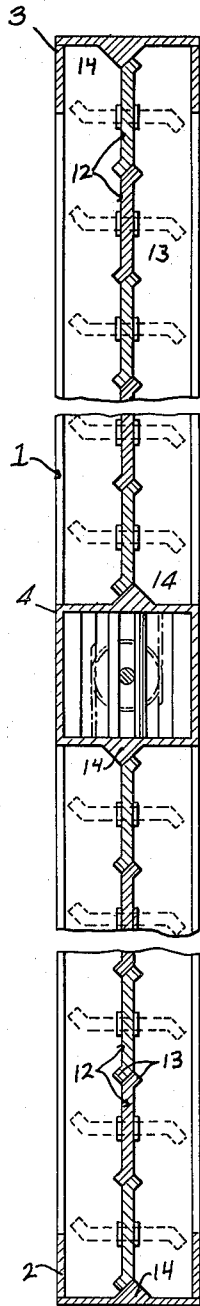


FIG. 10

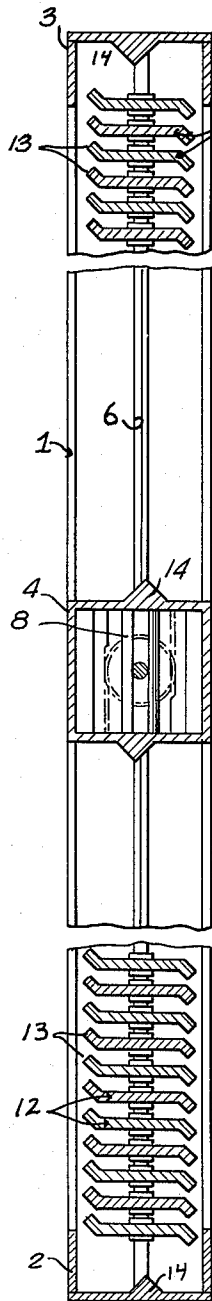


FIG. 11

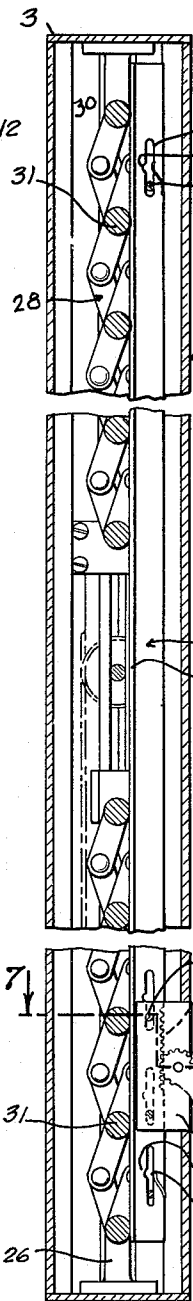


FIG. 12

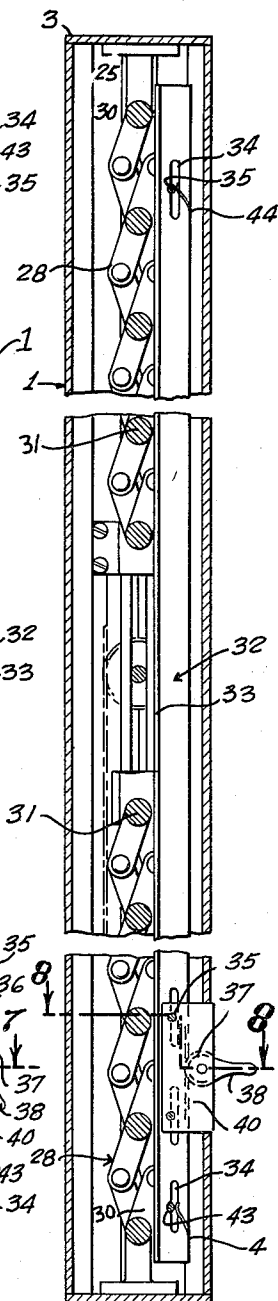


FIG. 13

INVENTOR.
PAUL J. HOWARD
BY *Lyons*
ATTORNEYS

Oct. 25, 1960

P. J. HOWARD
VENETIAN BLIND

2,957,520

Filed Aug. 4, 1958

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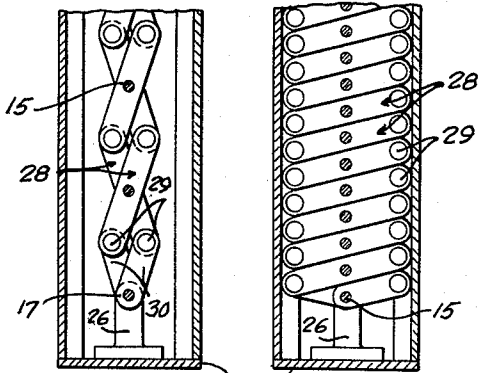
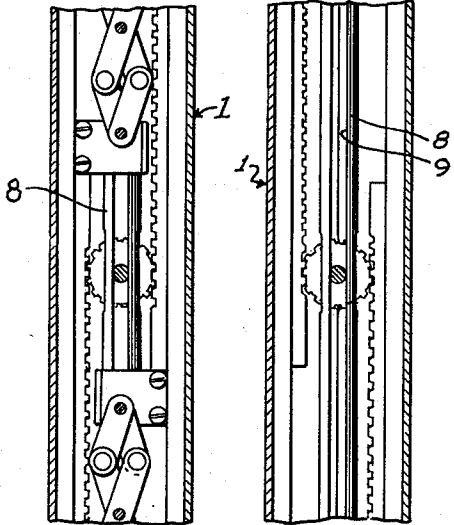
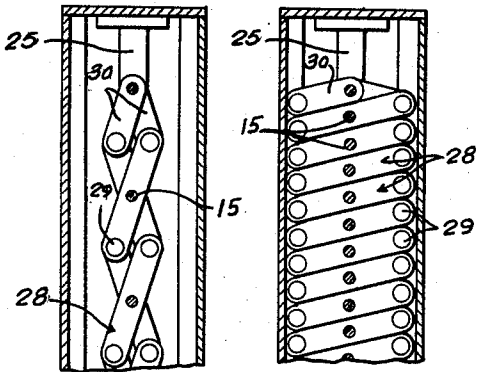


FIG. 14 2 2 FIG. 15

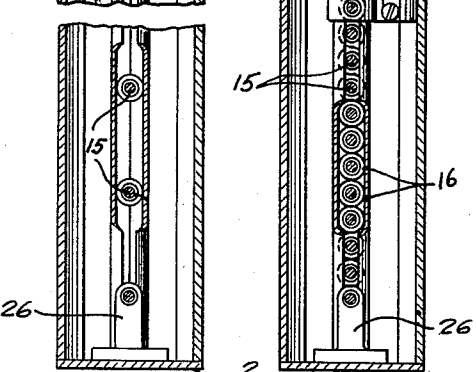
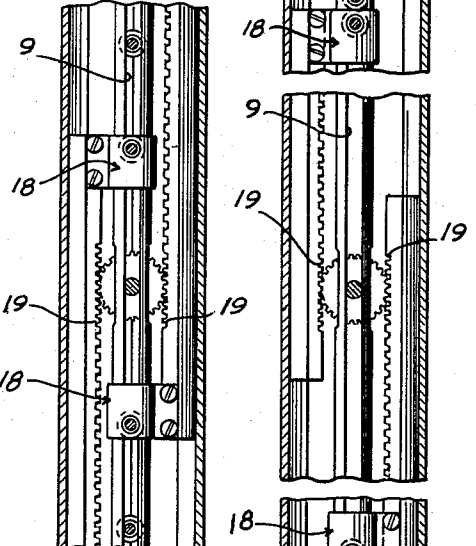
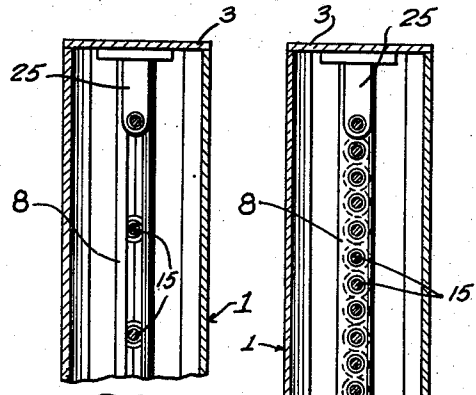


FIG. 16 2 2 FIG. 17

INVENTOR.
PAUL J. HOWARD

BY
Lyon Lyson
ATTORNEYS

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VENETIAN BLIND

**Paul J. Howard, % Paul J. Howard Company,
11700 National Blvd., Los Angeles 64, Calif.**

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4 Claims. (Cl. 160—113)

This invention relates to Venetian blinds, and included in the objects of this invention are:

First, to provide a Venetian blind which includes a marginal frame adapted to be set within a window opening, and wherein the entire control mechanism is contained within the marginal frame.

Second, to provide a Venetian blind construction which is divided into upper and lower units adapted to be raised and lowered, respectively, when effecting a full opening of the area governed by the Venetian blind.

Third, to provide a Venetian blind construction which, when in its closed position, is completely "peek proof" so that it is impossible to see through the Venetian blind when closed.

Fourth, to provide a Venetian blind construction which incorporates a novel means for tilting the Venetian blind slats.

Fifth, to provide a Venetian blind construction wherein the ends of the Venetian blind slats are provided with retainer elements arranged to move in vertical tracks or guides, so that the Venetian blind is firmly held in place to withstand flow of air therethrough in the event the Venetian blind covers an open window.

Sixth, to provide a Venetian blind construction which utilizes a novel rack and pinion drive to effect raising and lowering of the Venetian blind units.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

Figure 1 is a fragmentary front view showing the Venetian blind in its extended position;

Figure 2 is a fragmentary front view showing the Venetian blind in its retracted position;

Figure 3 is an enlarged, fragmentary, vertical, sectional view with portions in elevation, taken substantially through 3—3 of Figure 5, showing the Venetian blind slats in their closed position;

Figure 4 is a similar fragmentary, sectional view taken substantially through 4—4 of Figure 6 with portions in elevation, and showing the Venetian blind slats in their retracted position;

Figure 5 is a further enlarged, fragmentary, sectional view through 5—5 of Figure 3 showing portions in elevation, and showing the Venetian blind slat in its closed position;

Figure 6 is a similar fragmentary, sectional view through 6—6 of Figure 4 showing portions in elevation, and showing the Venetian blind slat in its retracted position;

Figure 7 is an enlarged, fragmentary, sectional view taken through 7—7 of Figure 12 showing particularly the means for rotating the Venetian blind slats, the rotating means being shown in its operating position;

Figure 8 is a similar fragmentary, sectional view taken through 8—8 of Figure 13, showing the rotating means in its retracted position;

Figure 9 is a fragmentary, sectional view through 9—9 of Figure 3, showing particularly the rack and pinion

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drive means for extending and retracting the Venetian blind slats;

Figure 10 is a fragmentary, vertical, transverse, sectional view taken through 10—10 of Figure 3 with the Venetian blind slats shown by solid lines in their closed position and by broken lines in an open position;

Figure 11 is a similar sectional view taken through 11—11 of Figure 4 showing the Venetian blind slats in their retracted position;

Figure 12 is a fragmentary, vertical, sectional view taken through 12—12 of Figure 7, showing the means for rotating the Venetian blind slats in its operating position;

Figure 13 is a similar sectional view taken through 13—13 of Figure 8, showing the rotating means in its retracted position;

Figure 14 is a fragmentary, vertical, transverse, sectional view taken through 14—14 of Figure 3, showing the linkage which connects the Venetian blind slats in its open or extended position;

Figure 15 is a similar sectional view taken through 15—15 of Figure 4, showing the Venetian blind linkage in its retracted position;

Figure 16 is a fragmentary, vertical, transverse, sectional view through 16—16 of Figure 3, showing the rack and pinion drive means for extending and retracting the Venetian blind slats;

Figure 17 is a similar sectional view taken through 17—17 of Figure 4, showing the extending and retracting means in its retracted position;

Figure 18 is a fragmentary end view of a series of Venetian blind slats showing a modified form of end pin assembly;

Figure 19 is a fragmentary, perspective view of one of the modified end pin assemblies.

The Venetian blind includes two pairs of complementary, vertical, frame members 1 which may be formed of identical channel-shaped extrusions positioned with their flanges in confronting relation so as to form a box housing of rectangular cross section. The upper ends of the pairs of complementary, vertical, frame members are joined by an upper channel frame member 3 positioned with its flanges facing downward and a lower channel frame member 2 positioned with its flanges directed upwardly. Midway between the upper and lower channel frame members there is positioned a central box frame member 4 which extends to the vertical frame members 1.

The complementary, channel-shaped, vertical, frame members 1 include confronting outer flanges 5 which abut each other and constitute the outer wall of the Venetian blind frame structure. The other flanges of the vertical frame members 1 form partition walls 6 separated from each other by a vertical slot 7.

Disposed adjacent the confronting flanges 5 is a tubular track 8 which may comprise integral semi-cylindrical ribs at the confronting extremities of the flanges 5. The tubular track 8 is provided with a vertical slot 9 which is coplanar with the slot 7.

Each vertical frame member 1 is provided with a semicylindrical guide channel 10 located adjacent the flange 5 and confronting the tubular track 8. The guide channels 10 and tubular track 8 are thus located in a common plane parallel with the flanges 5.

The frame members 1 are provided with lips 11 which border the partition walls 6 so as to form channel-shaped recesses to enclose the ends of the Venetian blind slats, which will be described hereinafter.

The vertical frame members 1, upper and lower channel members 2 and 3, and central box member 4 define two rectangular openings which receive Venetian blind slats 12. Each Venetian blind slat is formed of a strip

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of metal and is provided along each edge with a flange 13, preferably disposed at a 45° angle to the plane of the slat.

The edge flanges 13 project in opposite directions so that the Venetian blind slats are essentially Z-shaped in cross section. The edge flanges of the adjacent slats are so arranged that they may move into interengagement when the Venetian blind slats are extended and rotated to their closed position, as shown best in Figure 10.

The upper and lower channel frame members 2 and 3 and the central box frame member 4 are provided with horizontal ribs 14 which are engaged by the extreme flanges of a set of the Venetian blind slats when the slats are in the closed position shown in Figure 10.

The extremities of each Venetian blind slat are provided with coaxial journal pins 15 which project beyond the slats 12 into the box-like housing formed by the vertical frame members 1. The journal pins 15 extend through the slots 7 and 9. The extremity of each journal pin 15 receives a ball journal 16 which rides in the tubular track 8 and is provided with a tubular stem 17 projecting through the slot 9.

Slidably mounted on the exterior of each tubular track 8 is a pair of traveler yokes 18. The lowermost (see Figure 17) of each pair of traveler yokes journals the tubular stem 17 of the uppermost slat of the lower set of slats disposed between the box frame member 4 and lower channel frame member 2. Similarly, the upper pair of traveler yokes 18 journal the tubular stem 17 of the lowermost slat of the upper set of slats mounted between the box frame member 4 and upper channel frame member 2.

The traveler yokes 18 are joined to racks 19 which ride in the guide channels 10. The pair of racks connected with the lowermost set of Venetian blind slats extend upwardly, whereas the pair of racks connected with the uppermost set of Venetian blind slats extend downwardly. The extremities of the upwardly directed and downwardly directed racks overlap and engage opposite sides of a pinion gear 20. The two pinion gears thus provided are connected by a shaft 21 extending through the central box frame member 4. The ends of the shaft 21 are supported by bearings 22.

At the central portion of the box frame member 4, or any selected location along the length thereof, there is provided a bevel gear unit 23 and a handle wheel 24, as shown in Figure 2. Rotation of the handle wheel causes opposed movement of the racks 19 so as to extend and retract the sets of Venetian blind slats.

The uppermost slat 12 of the uppermost set of slats is suspended at its extremities by a pair of brackets 25 supported from the extremities of the upper channel frame member 2, which overlie the upper ends of the vertical frame members 1. The brackets 25 may journal the tubular stem 17 of the uppermost slat. Similarly, brackets 26 journal the tubular stems 17 of the lowermost set of slats. Thus the extreme slats of the two sets do not move vertically in the frame structure but merely rotate.

Journalled on each pin 15 is a pair of links 28. Except for the journal pins connected with the end slats the links are journalled intermediate their ends and are interconnected by journal rivets 29. The journal pins connected with the end slats are connected to the links of adjacent journal pins by half links 30. The links associated with each set of slats thus form essentially a "lazy tong" construction which, when collapsed, provide a uniform minimum spacing between the Venetian blind slats and, when extended, provide a uniform maximum spacing therebetween, as shown respectively in Figures 15 and 14.

Each journal pin 15 within the box housing formed by one set of the vertical frame members 1 is provided, between the links 28 and the adjacent partition wall 6, with a turning roller 31. That is each Venetian blind slat is provided with a single turning roller. Slidably

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supported from the adjacent partition is a slide bar 32 having a yieldable marginal strip 33 adapted to engage all of the turning rollers 31 simultaneously.

The slide bar 32 is provided with vertical slots 34 which receive guide pins 35 extending from the adjacent partition wall 6. The lengths of the slots 34 are such as to permit rotation of the slats 12 from the solid line position, shown in Figure 10, through the broken line position to its opposite extreme position limited by interengagement of the edge flanges 13.

The slide bar 32 is provided with a rack section 36 equal to the length of stroke of the slide bar. The rack section is engaged by a pinion gear 37 having a handle 38 which protrudes through a slot 39 provided in the corresponding vertical frame member 1.

The pinion gear 37 is journalled between side plates 40. The side plates are supported from the adjacent partition wall 6, and if desired from a plate 41 by means of a pair of the guide pins 35. The side plates are provided with slots 42 which receive the pins. The slots 42 extend horizontally a slight distance so that the pinion gear 37 and its side plates 40 may move as a unit a slight distance, in a horizontal or lateral direction.

The series of slots 34 which guide the slide bar 32 are provided with notches 43 which, when these notches register with the guide pins 35, permit limited lateral displacement of the slide bar 32 relative to the turning rollers 31. That is, the slide bar 32, pinion gear 37, and side plates 40 move as a unit between the position shown in Figure 7 and the position shown in Figure 8. Springs 44 are provided on bars 32 to urge the slide bars 32 away from the rollers 31 when the notches 43 register with the pins 35 and the ends of springs 44 engage pins 35.

Operation of the Venetian blind is as follows:

Assuming that the Venetian blind is in its extended position, such as shown in Figures 1, 3, 10, 12, and 13, all of the Venetian blind slats of the two sets may be rotated simultaneously by movement of the handle 38 connected with the pinion gear 37. That is, the slide bar 32 engages the turning rollers 31 simultaneously to effect rotation. The engagement of the slide bar with the turning rollers is essentially a frictional engagement so that, if desired, any slat may be turned manually.

When the slats approach their horizontal or open position, as shown by broken lines in Figure 10, the notches 43 register with the guide pins 35 so that the slide bar 32 may clear the rollers 31. When the slats are moved to this position, the handle wheel 24 may be operated to retract the slats by operation of the racks 19 and pinion 20. That is rotation of the handle wheel 24 extends and retracts the Venetian blinds as shown best in Figures 16 and 17. It will be observed that the upper set of slats retract into a position adjacent the upper channel frame 3, whereas the lower set of slats retract to a position adjacent the lower channel frame 2.

It will be observed that when the slats are turned to their closed position, such as shown in Figure 10, the edge flanges 13 interchange and the edge flanges of the extreme slats engage the ribs 14 so that the Venetian blind when closed is substantially light proof.

In the drawings, it should be understood that the elements at the ends of the Venetian blind slats which support and control their movement is exaggerated in size for the purpose of illustration; that is, the slats 12 may be arranged to nestle closer in their retracted position without changing the construction of the supporting elements.

In order to present the most pleasing appearance when in their retracted position, the Venetian blind slats 12 should be inclined slightly, as shown in Figure 18. This is accomplished by providing modified journal pins 15a having yoke elements 15b which fit over the ends of the slats, and which have wedge-shaped legs. As shown in Figure 18, the surfaces of the yoke leg coincide with a

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plane between the offset extremity of one edge flange 13 and the root end of the opposite edge flange. When succeeding yokes lie flat against each other, the exposed portions of the edge flanges 13 present a pleasing pattern.

It should be noted also that when the Venetian blind slats are in their closed position, as shown by solid lines in Figures 3 and 10, the overlapping flanges 13 present the same pattern from either side of the window.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the exact details of the constructions set forth, and it embraces such changes, modifications, and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

What is claimed is:

1. A Venetian blind, comprising: a frame structure including complementary housing members defining therebetween a vertically slotted guide tube, said guide tube forming externally a guide rib, at least one of said housing members also having a rack guide confronting a side of said guide rib; a stack of Venetian blind slats including journal pins extending into said guide tube; journal means for said pins slidable in said guide tube; a slide member attached to an extremity of said stack of Venetian blind slats embracing said guide rib, and slidable thereon; a rack attached to said slide member and slidable in said rack guide; and means for moving said rack to effect movement of said stack of Venetian blind slats.

2. A Venetian blind, comprising: a frame structure including upper, lower, and intermediate cross members, the intermediate cross member being tubular, and complementary housing members joined to the ends of said cross members to define therewith upper and lower Venetian blind receiving openings; said complementary housing members defining therebetween a vertically slotted guide member forming internally a guide tube and externally a guide rib, said housing members also having a rack guide confronting a side of said guide rib; a stack of Venetian blind slats in each opening including journal pins for each slat extending into said guide tube; journal means for said pins slidable in said guide tube; a slide member attached to an extremity of each stack of Venetian blind slats for raising and lowering said slats; a rack attached to each slide member and slidable in a corresponding rack guide; a control shaft extending through said intermediate cross member; means incorporated in said guide member for journaling the ends of said control shaft; pinion gears adjacent the ends of said shaft engageable with the rack members, means on said intermediate cross member having a manually accessible portion and drivingly connected to said control shaft for rotating the same.

3. A Venetian blind, comprising: a frame structure in-

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cluding vertical frame members having a vertical guide tube therein and a vertical guide groove spaced from and facing said guide tube; a plurality of Venetian blind slats; coaxial journal elements at the extremities of each of said slats, said elements slidably fitting said guide tube for sliding movement therein to raise and lower said Venetian blind slats and to rotatably support said Venetian blind slats, means interconnecting said Venetian blind slats to maintain uniform spacing therebetween; means for raising and lowering at least one of said Venetian blind slats to thereby vary said uniform spacing and raise and lower the other slats and including a rack member movable in said guide groove and attached to said one Venetian blind slat; a pinion gear meshing with said rack member, and means for rotating said pinion gear.

4. A Venetian blind, comprising: a frame structure including vertical frame members, horizontal upper and lower channel frame members, and a central horizontal hollow box frame member extending between and fixed to said vertical frame members, said box frame member dividing the frame structure into upper and lower compartments; a Venetian blind unit mounted in each compartment and including a plurality of slats; means within said vertical frame members interconnecting the slats of each unit for maintaining a uniform spacing therebetween; a pinion drive means including a connecting shaft extending through said box frame member and pinion gears fixed on said shaft in said vertical frame members; rack members slidable in said vertical frame members, meshing with said pinion gears, and movable thereby in opposite directions; means connecting said rack members with at least one slat of each of said Venetian blind units to move said slats in opposite directions and thereby vary said uniform spacing and raise and lower the other slats; means on said box frame having a manually accessible portion and drivingly connected to said shaft for rotating the same.

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