Dec. 15, 1942. G. C. LAWSON 2,304,934

VENETIAN BLIND TILTING DEVICE

Filed April 23, 1942 2 Sheets-Sheet 1

Fig. 1

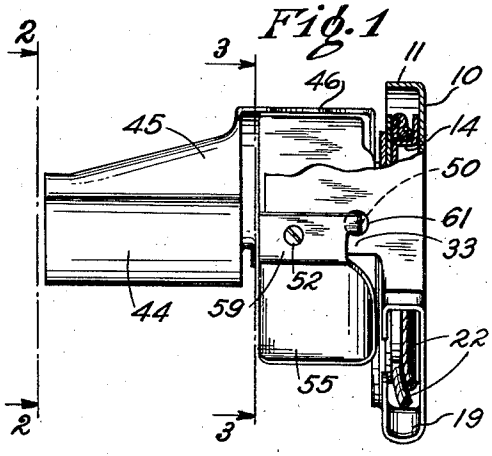


Fig. 2

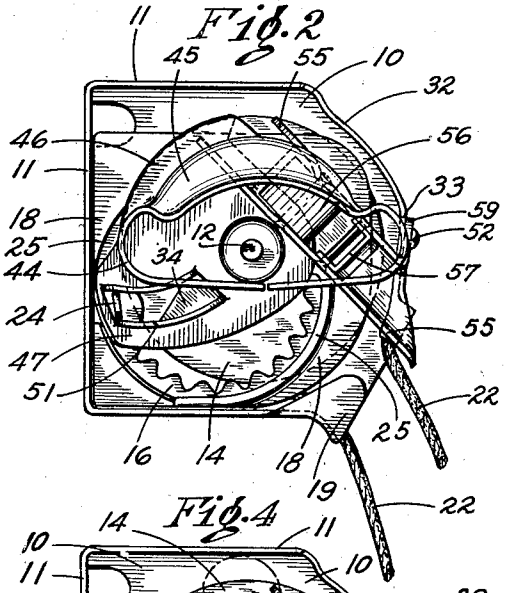


Fig. 3

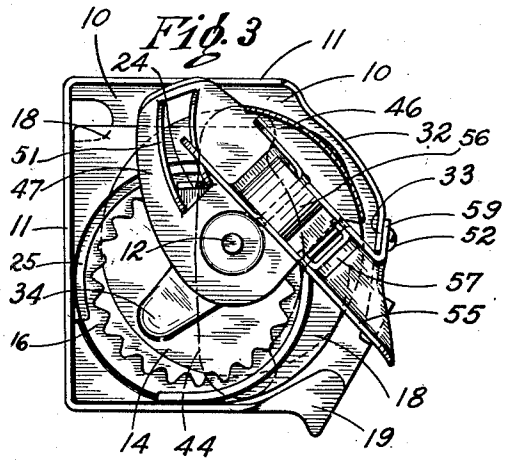


Fig. 4

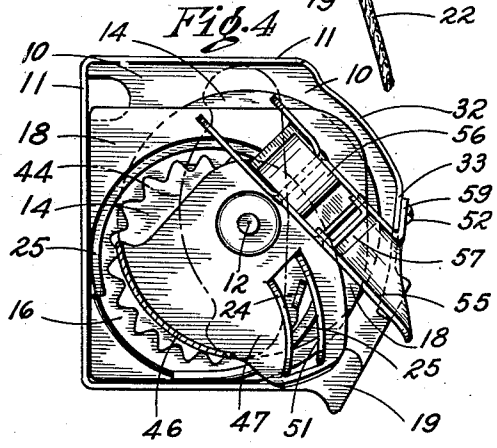


Fig. 5

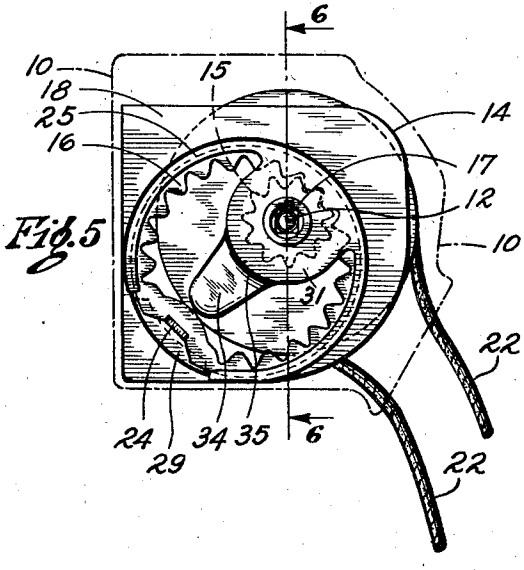
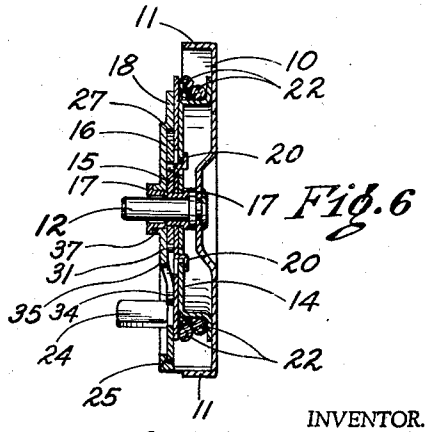


Fig. 6



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VENETIAN BLIND TILTING DEVICE

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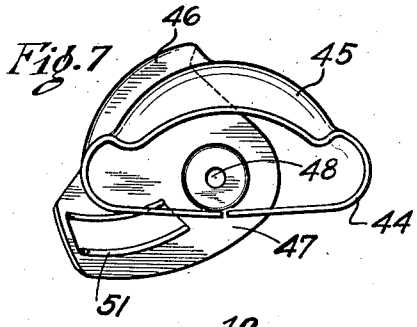


Fig. 7

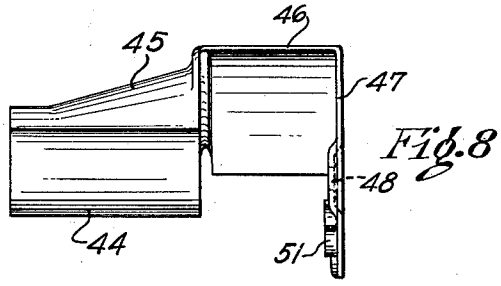


Fig. 8

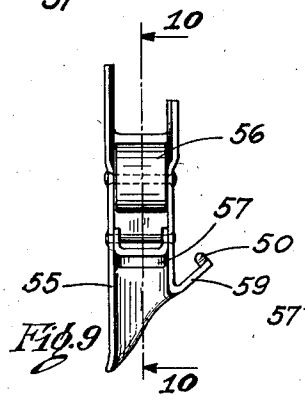


Fig. 9

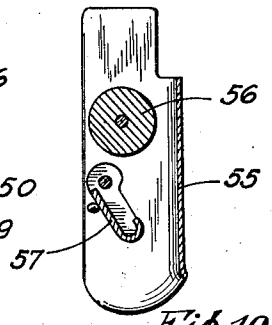


Fig. 10

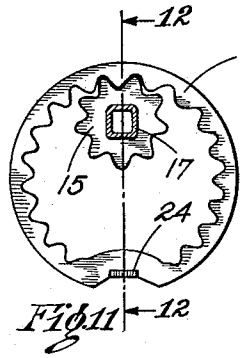


Fig. 11

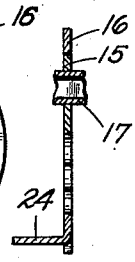


Fig. 12

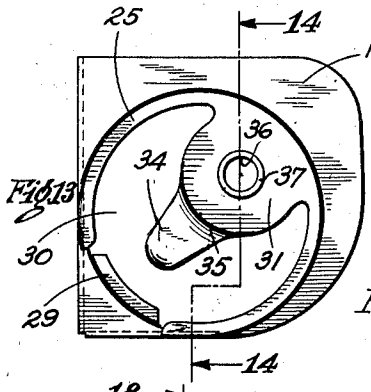


Fig. 13

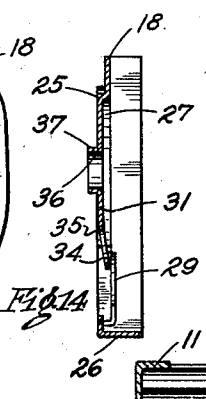


Fig. 14

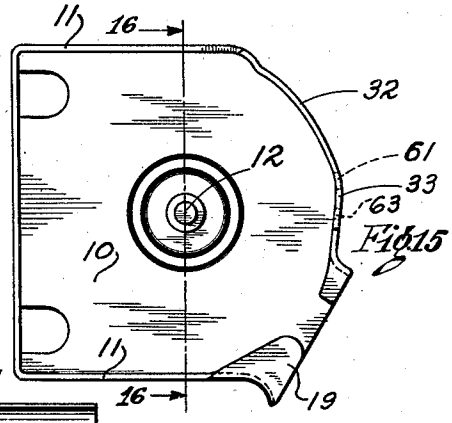


Fig. 15

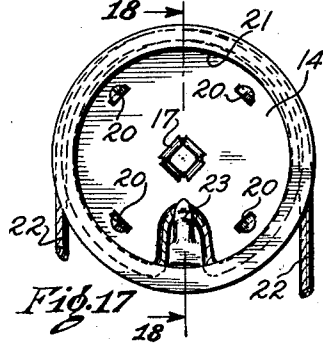


Fig. 17

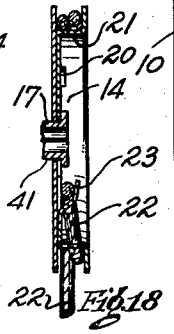


Fig. 18

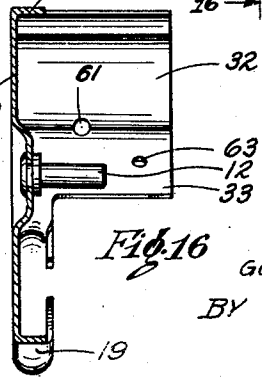


Fig. 16

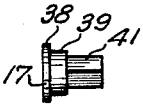


Fig. 19

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UNITED STATES PATENT OFFICE

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VENETIAN BLIND TILTING DEVICE

Gottfrid C. Lawson, Cleveland, Ohio

Application April 23, 1942, Serial No. 440,125

16 Claims. (Cl. 160—176)

This invention relates broadly to Venetian blinds and more specifically to improvements in the mechanism for tilting the slats or rails of such blinds.

The present invention constitutes an improvement over the structure disclosed in my prior Patent No. 2,202,293, dated May 28, 1940.

Heretofore certain efforts have been directed by the prior art workers to the construction of a Venetian blind that was capable of excluding all rays of light. In certain of the prior art devices the tilting mechanism for the blind was unable to retain the slats in their closed position and thus insure the exclusion of the light rays. This was often occasioned by the lack of a locking or friction member on the tilting mechanism so that the weight of the slats would overcome the action of the tilting mechanism causing the blind to open. Such a construction not only impaired the efficiency of the blind but also materially restricted the nicety of adjustment that is so often sought with such blinds.

The size and shape of the tilting mechanism embodied in the prior art devices is such as to greatly distract from the appearance of the blind so that in many instances the blind would not blend with the furnishings of a room. Furthermore, the various combinations of gears and pulleys, comprising the tilting mechanism of the prior art devices, presented a complicated structure which was exceedingly difficult to adjust or repair.

The present invention is designed to eliminate certain of the shortcomings apparent in the prior art devices. The head rail commonly employed for suspending the tilt rail and slats of a Venetian blind is eliminated, thus the blind, when raised, requires far less window space than the prior art devices. Through the elimination of the head rail all rays of light are excluded when the blind is closed. The tilting mechanism for the blind is composed of a number of gears or friction members actuated by a pulley which are assembled as an exceedingly small and compact unit. The size and shape of the tilting unit conforms to the contour of the tilt rail and supporting bracket of the Venetian blind, thus presenting a structure capable of blending with the surrounding furnishings.

Another object of the present invention is to provide a tilting mechanism having a gear train actuated by a pulley with a friction member engageable with the pulley for retaining the slats of the blind in various adjusted positions.

Another object is to provide the gear train of the tilting mechanism with a reduction gear which facilitates the tilting action of the slats while obtaining a finer degree of adjustment.

Still another object is to provide a connecting member between the tilting unit and tilt rail which is rotated when closing the blind to a position for excluding all light rays between the tilt rail and tilting mechanism.

A still further object is to provide the connecting member between the tilting mechanism and the tilt rail with a cam which is engaged by a lug on the tilting mechanism. The cam and lug are so arranged and designed that movement from the tilting gear is imported to the cam and thence the tilt rail by the lug, and yet movement cannot readily be transmitted in a reverse direction from the cam to the lug. In one position the parts are locked against movement in the reverse direction.

Further objects of the invention are to provide a tilting mechanism for a Venetian blind that is simple and compact, economic of manufacture and reliable and efficient in operation.

Other objects and advantages more or less ancillary to the foregoing and the manner in which all the various objects are realized will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawings:

Figure 1 is an elevational view of my improved tilting unit with certain portions thereof broken away to show parts otherwise hidden;

Figure 2 is an inner end view of the unit showing the tilting unit in an operative position, the view being taken on a plane indicated by line 2—2 of Figure 1;

Figure 3 is a sectional view of the tilting unit in an operative position, the view being taken on a plane indicated by line 3—3 of Figure 1;

Figure 4 is a view similar to Figure 3 showing the rail connector rotated at 180°;

Figure 5 is an elevational view of the gear assembly removed from the bracket housing the position of the housing being shown by dot dash lines;

Figure 6 is a transverse sectional view of the tilting unit, the view being taken on a plane indicated by line 6—6 of Figure 5 showing the housing in sections;

Figure 7 is an end view of the supporting or connector member for the tilt rail;

Figure 8 is a side elevational view thereof;

Figure 9 is an elevational view of the cord guide

and lock for raising and lowering a Venetian blind;

Figure 10 is a sectional view of the cord guide, the view being taken on a plane indicated by line 10—10 of Figure 9, the lock being shown in different positions.

Figure 11 is an elevational view of the gearing for rotating the tilt rail;

Figure 12 is a sectional view thereof taken on the line 12—12 of Figure 11;

Figure 13 is an elevational view of the guard shield or inner bracket housing for the gearing unit;

Figure 14 is a sectional view thereof taken on the line 14—14 of Figure 13.

Figure 15 is an elevational view of the supporting bracket or housing for the unit;

Figure 16 is a sectional view of the bracket taken on the line 16—16 of Figure 15.

Figure 17 is an elevational view of the sheave or pulley for the tilt unit;

Figure 18 is a sectional view of the sheave or pulley, the view being taken on a plane indicated by line 18—18 of Figure 17; and

Figure 19 is an elevational view of a bushing, used in the assembly of the parts.

Briefly the present invention includes a bracket, a housing adapted to be mounted upon a suitable support which is affixed to the inner side of a window casing or the like. A rail tilting mechanism is disposed within the bracket being held therein by a cord lock, and a tilt rail connecting member is pivotally connected to the tilting mechanism and arranged to be tilted thereby which tilting is communicated to the tilt rail of the blind for the usual purposes.

As best shown in Figure 15, the bracket housing is fabricated from sheet metal and comprises a generally flat side portion or member 10 having a laterally extending rim or flange 11 thereon with portions of the flange configured to provide a guide for a tilt cord at 19. A stud 12 is secured to the side member 10 in a plane normal thereto for rotatably supporting the tilt assembly.

The flange 11 of the side member 10 is widened at 32 to provide a laterally extending apron, Figure 16, which terminates at its lower edge in a flat surface 33 for supporting a cord lock. The portion of the flange 11 subjacent the apron 32 and the flange formed on the adjacent edge of the side member 10 are configured to define a cord guide 19 as previously mentioned.

The tilt assembly comprises a sheave or driving member 14, a pinion gear 15 rotatable therewith and an internal ring gear 16 driven by the pinion. The sheave 14 and pinion gear 15 are secured to a bushing 17 which is arranged to be rotatably mounted on the stud 12. The bushing 17 extends through a side plate or member 18 of Figure 13 which is of a configuration complementary to the side member 10 and arranged to retain the ring gear 16 in engagement with the pinion gear 15. The edges of the side member 18 are bent to provide flanges which are positioned within the flange 11 of the member 10 so that the side members 18 and 10 define a housing for the sheave, pinion gear and ring gear.

The sheave 14 as best shown in Figures 17 and 18 is preferably formed from a pair of flat circular discs secured together by tongues 20 struck from one of the discs and projecting through openings formed in the other. One of the discs is provided with an offset flange 21 defining a channel for the reception of a cord 22. The central portion of the cord 22, Figure 17, extends through an opening formed in the flange 21 and is secured to a lug 23 on the face of the disc carrying the flange 21. The lug may be bent over to clamp the end securely after the cord is inserted between the disc and the lug. The opposite ends of the cord 22 are each wound about the sheave for at least one complete revolution to allow for the rotation of the sheave a distance sufficient to completely open and close the slats of the blind.

The housing side member 18 (Figure 13) is upset at 25 for the major portion (300°) of a circle to provide a circular bearing surface 27 for the periphery of the ring gear 16, the ring gear being best shown in Figure 11. The plate is upset in the opposite direction at 29 for the remainder of the circle (60°) to provide a similar but shorter bearing surface for the other side of the ring gear. The ring gear 16 is intended to be rotated in this bearing, being held in place by the sheave 14, and the pinion 15, the pinion 15 being driven by the sheave.

The material of part 25 spaced from the bearing surface and within the boundaries thereof is removed to provide a generally crescent shaped opening 30 to allow for the movement of a lug 24 extending from and integral with the ring gear.

Opposite to the short bearing flange 29 a tongue is provided which comprises a wide base portion 31 in which the bushing 17 is rotatably journalled and from which a finger 34 extends which finger is offset at 35 so that the end of the finger may provide a frictional brake for engagement with the surface of the sheave (Figures 5 and 6).

The tongue 31 is provided with a circular opening 36 which is formed with a laterally extending flange 37 that provides a bearing for the bushing 17. The bushing 17 as best shown in Figure 19 has an enlarged circular head 38 next to which is provided a circular shoulder 39 for rotatable engagement in the bearing 37. Extending from the shoulder 39 is a square shank 41 upon which is disposed the pinion 15, adjacent the shoulder 39, and the sheave 14 next to the pinion. The pinion and sheave have square central openings and are locked on the bushing against the shoulder 39 by heading over the end of the bushing as illustrated in Figs. 6, 17 and 18.

In assembling the parts of the tilt gear assembly the ring gear is first inserted in the bearings 25 and 29. The bushing 17 is then inserted through the bearing 37. The pinion is then placed over the square shank of the bushing followed by the sheave after which the bushing is headed over thus completing the assembly of the tilt gear.

The tilt rail support or connecting member, Figures 7 and 8, comprises a sheet metal member having a hollow body portion 44 of a configuration complemental to a tilt rail, not shown, and arranged to be telescopically engaged therein. The upper surface of the body is provided with a flared portion 45 terminating in an extension 46 of an arcuate cross section. The extension 46 is provided with an integrally formed depending arm 47 having an opening 48 therein for the reception of the stud 12. A substantially arcuate shaped camming slot 51 is formed in the arm 47 through which the lug 24 on the ring gear projects. The portions of the arm 47 defining the slot 51 are flanged to provide a wide bearing surface for engagement of the lug therewith. The camming surface 51 is designed to allow move-

ment of the pulley to be transmitted to the tilt rail of the blind but hinders and in one position prevents movement of the tilt rail connector from being imparted through the cam to the lug and sheave.

The tilt rail connecting member and the tilt gear assembly are retained upon the stud 12 within the side member 10 by the raising cord lock.

The raising cord lock, Figures 3, 9 and 10, comprises a channel shaped member 55, having a guide roller 56 and a cord lock 57 pivotally mounted therein. The lower end of the channel shaped member 55 has an angularly extending flange 59 formed on one side and being of a configuration complemental to the flat portion 33 on the flange 11. A lug 50 is formed on the flange 59 and arranged to extend through an opening 61 formed in the flat portion 33. The cord lock is secured to the side bracket 10 by a screw 52, Figure 3, which extends through the flange 59 and an opening 63 formed in the flat surface 33. Inasmuch as the raising cord lock 57 and guide roller 56 do not constitute any part of the present invention, other than as a means for retaining the supporting arm for the tilt rail and sheave within the bracket, a further description thereof is not deemed necessary apart from such reference thereto as may be deemed necessary to an understanding of the present invention. It should be noted, however, that the cord lock extends into the bracket and loosely engages the arm 47, holding the same onto the stud 12 and thus holding all the parts in assembled position.

In operation when the ends of the cord 22 that extend through the cord guide 19 are pulled, the sheave 14 and pinion gear 15 will be rotated about the stud 12. The internally toothed ring gear 16 which is in mesh with the pinion 15 is thus rotated thereby. The ring gear 16 which carries the lug 24 moves the lug which engages the flanges of the camming slots 51 for rotating the connecting member 45 and tilt rail, the lug sliding in the camming slot.

When closing the blind from its full open position of Figure 2 the connecting member is rotated approximately 90° counterclockwise as viewed in Figure 3. In this position most of the weight of the slats is supported by the tapes on the high or uppermost side of the tilt rail while the tapes on the lower side of the tilt rail are substantially loose. When the blind is in this position the weight of the slats tends to exert sufficiently turning movement on the tilt rail to cause the blind to open, that is the cam surface engages the lug rotating the ring gear and pinion.

Referring to Figure 3 wherein the connecting member 35 for the tilt rail is shown rotated to its maximum degree, which would represent the position taken when the blind is closed, we find that the turning movement of the connecting member is transferred from the camming surface 51 to the lug on the ring gear 16. It should be noted, however, that the curvature of the camming surface 41 is so proportioned that the resultant of the vector forces applied to the lug on the edge of the ring gear is directed substantially through the center of rotation of the ring gear. This results in the forces being directed substantially through the dead center or at least so close to the dead center of the ring gear 16 that only a minimum amount of pressure need be exerted by the finger 34 upon the sheave 14 to restrain the movement of the tilting assembly. Such an arrangement tends to lock the blind in its closed position and overcomes any tendency of the blind to open due to the weight of the slats.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. A tilting mechanism for a tilt rail of a Venetian blind comprising a bracket having a stud thereon, a bushing rotatably mounted on the stud, a sheave, a pinion gear, said sheave and gear affixed to said bushing, an internally toothed spur gear engageable with said pinion gear, a pin extending from said spur gear in a plane normal thereto, a shield extending over said gears and having its edges engage said bracket, said shield provided with an opening through which said pin projects, said pin movable within the opening in said shield contemporaneous the movement of said sheave, said shield provided with a segment defined by the opening therein for frictionally engaging said sheave, a sleeve affixed to the tilt rail, an arm on said sleeve loosely mounted on the stud superjacent said shield, said arm having an aperture therein defining a guide for said pin and means affixed to said bracket and engageable with said arm to retain said sheave and gears upon the stud.

2. A tilting mechanism for a tilt rail of a Venetian blind comprising a sleeve engageable with the tilt rail and having an arm extending therefrom, a bracket, mechanism within said bracket for actuating the tilt rail including a driving member, an intermediate member and a driven member, and means on said driven member engageable with the arm for rotating said sleeve.

3. A tilting mechanism for a tilt rail of a Venetian blind comprising a sleeve to be secured to the tilt rail, a depending arm on said sleeve, a bracket, a sheave rotatably journaled therein, a gear driven by said sheave, a second gear actuated by said first named gear, a pin on said second gear engageable with said arm to rotate said sleeve.

4. A tilting mechanism for a Venetian blind having a tilt rail comprising a crank secured to the tilt rail, a bracket, a pulley rotatably journaled therein, a member driven by said pulley, a second member associated with and driven by said first named member, and means on said second member engageable with said crank for actuating the tilt rail.

5. A tilting mechanism for a Venetian blind having a tilt rail comprising a crank secured to the tilt rail, a bracket, a pulley rotatably journaled therein, a member driven by said pulley, a second member associated with and driven by said first named member, a pin on said second member connected with said crank, and frictional means engageable with said pulley to retain said crank in a predetermined position.

6. A tilting mechanism for a Venetian blind having a tilt rail comprising a crank secured to the tilt rail, a bracket, a pulley rotatably journaled therein, a member driven by said pulley, a second member associated with and driven by said first named member, a pin on said second member, said pin extending through an arcuate slot formed in said crank and arranged to engage

a portion of the slot for locking said crank in a predetermined position.

7. A tilting mechanism for a tilt rail of a Venetian blind comprising a sleeve secured to the tilt rail, a depending arm on said sleeve, a bracket having a stud thereon, a bushing rotatably mounted on the stud, a pulley affixed to said bushing, a pinion gear secured to said bushing contiguous said pulley, an internally toothed spur gear engageable with said pinion gear, a shield extending over said gears with its edges engaging said bracket, said shield having an aperture therein with the portions defining the aperture constituting guides for said spur gear, and means on said spur gear engageable with said arm to rotate said sleeve.

8. A tilting mechanism for a Venetian blind tilt rail comprising a sleeve engageable with the tilt rail, a depending arm on said sleeve, a bracket, a sheave rotatably mounted on said bracket and having an aperture formed in the peripheral surface, a tilt cord looped about said sheave with a portion extending through the aperture in the sheave and anchored to a lug thereon, a gear driven by said sheave, a second gear actuated by said first named gear, a pin on said second gear engageable with said arm and means on said bracket to retain said sheave and gears in operative position.

9. A tilting mechanism for a Venetian blind tilt rail comprising a sleeve engageable with the tilt rail, a depending arm on said sleeve having an arcuate shaped slot formed therein, a bracket, a sheave rotatably mounted therein, a gear on said sheave, a second gear engageable with said first gear, a shield extending over said gears, said shield having an opening therein with the portions defining the opening constituting guideways for the retention of said second gear, a portion of said shield engageable with said sheave to frictionally restrain the movement thereof and a pin on said second gear extending through the openings in said shield and arm and engageable with the portions of the arm defining the opening therein to effect the movement of said sleeve contemporaneous the rotation of said sheave.

10. A tilting mechanism for a tilt rail of a Venetian blind comprising a bracket provided with a stud, mechanism mounted on the stud for actuating the tilt rail including a sheave having a tilt cord looped about the periphery with the central portion of the cord anchored to a lug on a face of the sheave, a gear train driven by said sheave, a pin on one of the gears of said train, a sleeve secured to the tilt rail, a depending arm on said sleeve loosely mounted on the stud, said arm provided with an arcuate shaped slot for the reception of said pin and means affixed to said bracket to retain said arm and sheave on the stud.

11. A tilting mechanism for a Venetian blind tilt rail comprising a sleeve secured to the tilt rail, a depending arm on said sleeve, a camming surface on said arm, a bracket, a sheave rotatably journaled therein, a gear train driven by said sheave and means on said gear train engageable with the camming surface of said arm to rotate said sleeve.

12. A tilting mechanism for a Venetian blind tilt rail comprising a crank secured to the tilt rail, a cam thereon, a bracket, a pulley rotatably journaled therein, a member driven by said pulley, a second member associated with and actuated by said first member and means on said second member engageable with said cam for actuating said crank.

13. A tilting mechanism for a tilt rail of a Venetian blind comprising a sleeve secured to the tilt rail, a cam on the sleeve, a bracket, a pulley rotatably journaled therein, a gear driven by said pulley, a second gear engageable with and driven by said first named gear, a pin on said second gear engageable with said cam for imparting the movement of said pulley to said sleeve, said cam being configured to arrest the movement of said sleeve.

14. A tilting mechanism for a tilt rail of a Venetian blind comprising a bracket, driving means mounted therein, a driven member connected to the tilt rail, a cam on said driven member, means on said driving member engageable with said cam to actuate said driven member, said cam being configured to arrest the movement of said driven member.

15. An apparatus for tilting a tilt rail comprising connector means for supporting one end of the tilt rail and tilting the same, cam means formed in said connector, means for rotating said connector including a ring gear, a lug carried thereby and engageable with the cam and arranged upon rotation of the ring gear to move said cam and rotate the connector, said cam being so positioned that the vector forces due to pressure from the cam to the lug in the ring gear causes the resultant force to pass through the center of rotation of the ring gear and rotation is prevented.

16. An apparatus for tilting a tilt rail compriisng connector means for supporting one end of the tilt rail and tilting the same, cam means formed in said connector, means for rotating said connector including a ring gear, a lug carried thereby and engageable with the cam and arranged upon rotation of the ring gear to move said cam and rotate the connector, said cam being so formed and positioned that in at least one position the vector forces due to pressure from the cam to the lug in the ring gear causes the resultant force to pass through the center of rotation of the ring gear and rotation of the ring gear is prevented.

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