Dec. 3, 1940. H. K. LORENTZEN 2,223,997

VENETIAN BLIND TILTER

Filed Nov. 18, 1938

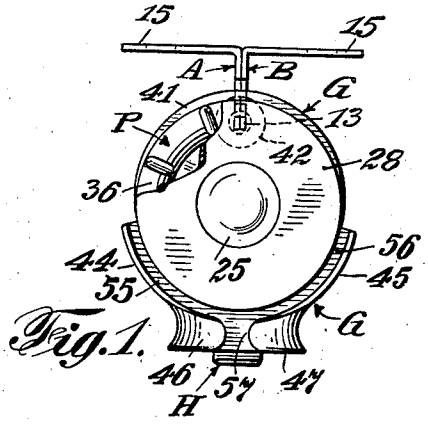


Fig. 1.

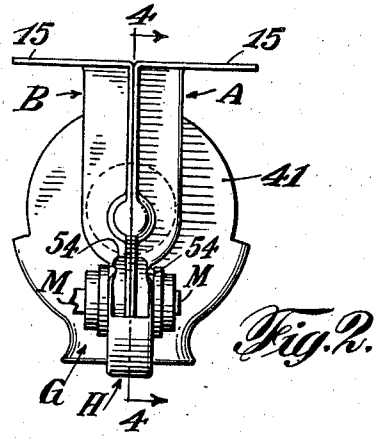


Fig. 2.

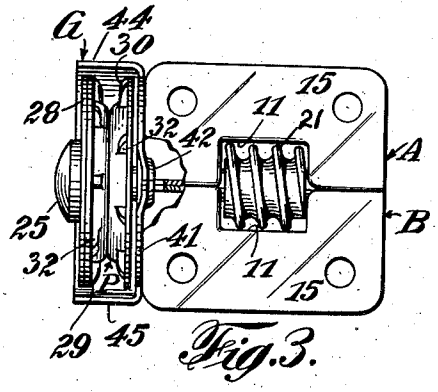


Fig. 3.

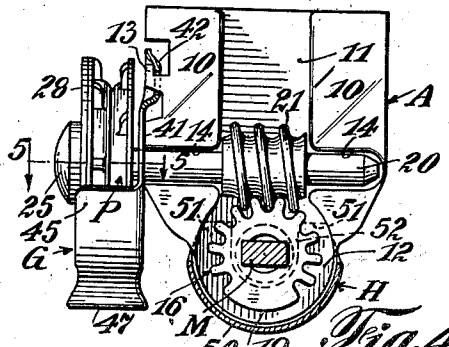


Fig. 4.

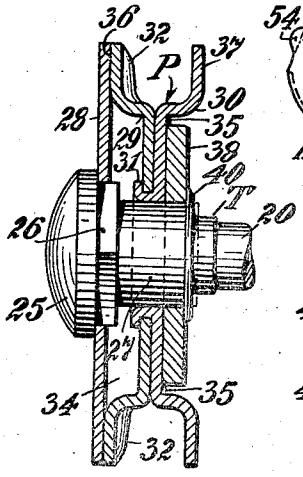


Fig. 5.

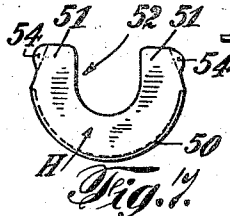


Fig. 7.

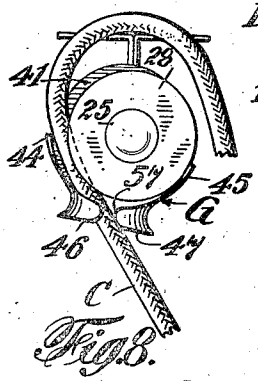


Fig. 8.

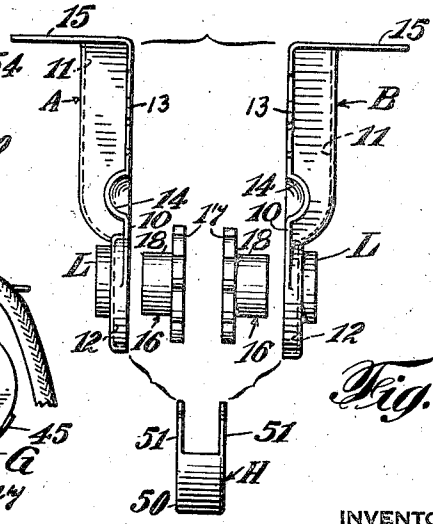


Fig. 6.

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VENETIAN BLIND TILTER

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Application November 18, 1938, Serial No. 241,133

8 Claims. (Cl. 156—17)

This invention relates to Venetian blinds, and for the most part the features involved in the invention are incorporated in a unit customarily referred to as a tilter. This tilter is, of course, used to tilt the upper slat of a Venetian blind and thereby incline all of the slats, which are articulated with the upper slat in a conventional manner.

Venetian blind tilters customarily embody a drive shaft from which tilting movement is desired, often through a worm and gear assembly. Usually the drive shaft is provided with a pulley adapted to be driven by a cord which passes over the pulley and has its two ends hanging free in suitable position to be grasped by the operator. If the cord cumulatively slips or crawls in one direction over the pulley during repeated manipulations of the blind, one end of the cord eventually climbs inconveniently high while the other end droops too low. For some reason, such cumulative slippage of the cord takes place in very many installations despite ribbed pulleys, cord guides, and other means that are usually used to minimize cord slippage. Accordingly, in actual practice it periodically becomes necessary with many installations to manually lift the cord from the pulley and relocate it thereon. Of course, this is considerable bother to a Venetian blind user, who ordinarily has to employ a stepladder or the like to reach the pulley.

A principal object of the present invention is to provide a Venetian blind with tilting mechanism which permits quick and easy relocation of the cord to compensate for accumulated slippage.

Another object of the invention is to produce a Venetian blind tilter which provides for relocation of a slipped operating cord without any manipulations other than mere pulling of the cord to the correct position.

A further object of the invention is to provide for ready and quick assembly of the operating cord with the rest of the tilter when the tilter is being originally installed.

An additional object of the invention is to provide a Venetian blind tilter which effectively encloses the operating parts and which provides for adequate lubrication of the same.

A still further object of the invention is to accomplish the foregoing results with a construction adapted for satisfactory and economical quantity production, largely from inexpensive stamped sheet metal parts.

Various specific and detailed objects of the invention will be apparent from the accompanying disclosure.

Fig. 1 of the drawing is, in general, a front elevation of a tilter embodying the invention. A portion of a friction disc is cut away to show the pulley, and the pulley cord is omitted for the sake of clarity.

Fig. 2 is a rear elevation of the tilter structure shown in Fig. 1.

Fig. 3 is a top plan view of the tilter structure shown in Fig. 1, portions of the mounting flanges being cut away to show details below them.

Fig. 4 is in general a vertical section taken on the line 4—4 of Fig. 2, but the pulley and certain associated parts are shown in elevation.

Fig. 5 is a horizontal section of the pulley and certain associated parts taken in general on the line 5—5 of Fig. 4.

Fig. 6 is an exploded view showing the parts of the tilter housing and certain gears enclosed by the housing.

Fig. 7 is a side elevation of a dish-like member which retains lubricant for the gears.

Fig. 8 is a front elevation of the tilter, on a reduced scale, illustrating how the cord is inserted when initially installed.

The housing of the tilter is made up primarily of two stamped sheet metal shells designated as a whole by A and B respectively. These two shells are identical except that one is a so-called mirror reversal of the other so that the two shells may be fitted together in complementary relationship. Thus, the detailed description applies equally well to both of the shells, and the same reference characters are applied to the corresponding parts of the two shells. Preferably, each shell is stamped in one piece.

Each shell has a vertical flat face portion 10 that is separated into two parts by a vertical channel 11. This channel is open at both ends and connects a gear-receiving depression 12 with the top of the shell. The depression 12 is shallower than the main portion of the channel 11; and as the channel approaches the depression, it diminishes in depth and merges smoothly into the depression 12. Transversely of the channel 11 the shell is provided with a semicircular shaft-receiving recess 14, which may be in two parts, on opposite sides of channel 11 as shown in Fig. 4. Adjacent to one edge each of the shells is provided with a hook 13. At the top, each of the shells A and B is provided with a horizontal flange 15 adapted to be secured by screws or other means to a suitable support for mounting the tilter.

Included in the tilter are two duplicate gear

elements 16, 16. These are assembled face-to-face so as to, in effect, constitute one gear. Each of the gear elements 16, 16 may be so stamped from sheet metal as to have a toothed disc 17 and a hub portion 18. As shown in Fig. 4, the toothed disc portion 17 is adapted to be located in gear-receiving depression 12. The hub portion 18 makes a bearing fit with perforated boss L (Fig. 6) formed integral with depression 12. In order that the gear elements 16, 16 may be duplicates, it is necessary that they be provided with an even number of teeth so that the respective teeth of the two gear elements will be in alignment when the gear elements are positioned face to face. If desired, the entire periphery of disc portion 17 may be toothed, but I prefer to leave a blank space 19 (Fig. 4) which acts as a stop to prevent complete rotation of gears. The gear hubs 18, 18 are provided with duplicate non-circular holes, e. g., rectangular holes, to receive and drive a connector member M (Figs. 2 and 4) projecting from the top slat of the blind.

As shown more particularly in Fig. 4, a drive shaft 20 is adapted to be journalled in shaft-receiving recesses 14, and the shaft carries a worm 21 which meshes with the gear elements 16, 16. In assembly, the gear elements 16, 16 are placed in the respective gear-receiving depressions 12, 12. Then the tilter housing is formed by bringing the two shells A and B together in face-to-face relationship and permanently securing them together by suitable means such as spot welding. This housing is then plated, or otherwise suitably finished, thereby covering all manufacturing scars, including the welding scars. Thereafter the worm 21 and shaft 20 are installed, as will be described later.

The free end of the shaft 20 is provided with an integral head 25, adjacent to which is an integral square shank portion 26 (Fig. 5); and adjacent to the square shank portion 26 there is a round shank portion 27. Initially this round shank portion 27 extends to the point designated by T in Fig. 5. Telescoped on to the square shank portion 26 is a friction disc 28, preferably made of suitable spring material such as spring bronze. The hole in the center of disc 28 corresponds to square shank 26, so that the disc cannot rotate with respect to shaft 20. Telescoped onto the round shank portion 27 is a sheet metal pulley designated as a whole by P. This pulley is shown as made up of stampings 29 and 30 permanently secured together at 31 and provided with ribs such as 32 to increase the frictional contact with the pulley cord C (Fig. 8).

It will be noted that the pulley is of such configuration as to have its axial faces provided with annular recesses 34 and 35 adjacent to the drive shaft, thus providing salient peripheral zones at 36 and 37. Telescoped onto the round shank portion 27, and located in annular recesses 35 is an abutment disc 38. After disc 38 has been placed on the shaft, a suitable cylindrical tool is driven axially of the shaft to displace metal from the point T and form an integral collar 40 which permanently secures the parts together in the relationship shown in Fig. 5. If abutment disc 38 is provided with an octagonal hole surrounding shank 27, metal will flow into the corners of the hole as collar 40 is formed, thereby preventing rotation of disc 38 relative to the shaft 20.

The force applied in forming collar 40 shifts the pulley axially on the shank 27 against the opposing force of spring disc 28. Thus, spring disc 28 is left in a stressed condition in which it permanently and frictionally engages the peripheral zone 36 of the pulley. Of course, when collar 40 is being stamped, friction disc 28 can be supported as required to limit the stressing of disc 28 to the desired degree.

It will be seen that the pulley P is rotatably mounted on the shaft 20 but is coupled thereto by friction disc 28. Thus, when the pulley is rotated by operating cord C, the gear 16 is rotated to tilt the blind if the gear is free to rotate. However, if the gear is held against rotation (as by the action of non-toothed sector 19, or by the tilt slat of the blind striking an obstruction), rotation of the pulley merely results in slippage between the pulley and friction disc 28, thereby resulting in an idle movement of the pulley cord. In this way, the positions of the ends of the cord can be readily readjusted to compensate for slippage of the cord on the pulley, when such slippage has accumulated during a period of use of the blind.

Associated with the pulley P is a cord guide designated as a whole by G. This guide is stamped from a single piece of sheet metal and includes a flat portion 41 which is located between the pulley P and the housing of the tilter. Stamped in flat portion 41 is a perforated boss 42 by which the cord guide is suspended from hook 13 as shown in Fig. 4. Of course, the portion 41 of the cord guide is perforated to permit shaft 20 to pass through it. If this perforation corresponds in size to the size of shaft 20, the cord guide will not be able to oscillate sidewise with respect to the pulley. However, if this perforation is larger than shaft 20, the cord guide will be able to oscillate sidewise, as more fully explained in my application Serial No. 119,065, filed January 5, 1937. In practice I may make the cord guide either way, viz., either so that it is stationary with respect to the pulley, or so that it oscillates sidewise with respect thereto. Included in the cord guide are integral arcuate guide flanges 44 and 45 which overlie, but are spaced from sectors of the periphery of the pulley P. At their bottoms, the guide flanges 44 and 45 merge into curved guide fingers 46 and 47 respectively, which form a loop that holds the depending branches of the pulley cord C close together. This loop, however, is not a closed loop since the ends of the curved guide fingers 46 and 47 are spaced apart in opposed relation, as shown in Figs. 1 and 8.

The tilter housing having been previously assembled (including the gear 16), the cord guide G is merely hung in place on hook 13 in an obvious manner. Then worm 21 is dropped in mesh with gear 16, this dropping being provided for by the vertical channels 11, 11. Of course in putting the worm in place, care should be taken to see that the two gear elements 16, 16 are rotatively aligned to obtain registration between the respective teeth on the two gear elements, the respective blank portions 19 on the two gear elements, and the respective holes for connector member M. Pulley P and associated parts having been permanently affixed to shaft 20 as previously described, the shaft is installed in the tilter. To do this it is merely necessary to insert the free end of the shaft 20 (from the left side of Fig. 4) into the journals provided by shaft-receiving recesses 14, 14, and at the same time drive the shaft through the worm 21. The shaft 20 is provided with suitable knurling or projections which en-

gage the bore of the worm and permanently secure the shaft and the worm in the relationship shown in Fig. 4. For this purpose I prefer to provide the shaft 20 with interlocking projections as disclosed in detail in my application Serial No. 219,303, filed July 15, 1938.

It is difficult and expensive to so unite the shells A and B that the housing will be oil tight. However, I provide a dish-like lubricant retainer H (Figs. 2, 4, 6 and 7) which retains lubricant for the gearing. This retainer is stamped from a single piece of sheet metal and comprises a trough portion 50 and four clip portions such as 51. In shape the dish-member H corresponds to the bottom of the tilter housing which encloses the gear 16; and this dish-like member is adapted to be snapped into place over the housing, where it occupies the position shown in Figs. 2 and 4. Recesses 52, Fig. 7 (one in each side of the dish-member), provide space for the tilt bar connector M, and the clip members 51 are each provided with an ear 54. These ears snap over the top of the gear-receiving depressions 12, as shown in Fig. 2, and hold the member H in place. Thus the member H acts as a lubricant retainer permitting a certain level of lubricant to be kept about the gear 16 and thereby keeping the worm and gear assembly lubricated.

The cord guide G is made with spaces at 55, 56 and 57 (Fig. 1) which are correlated with the thickness of the pulley cord C. The space 57 between the opposed ends of guide fingers 46 and 47 is less than the thickness of the pulley cord, but great enough to permit the cord to be inserted through it when the cord is diametrically compressed. The spaces at 55 and 56 are similarly correlated to the thickness of the pulley cord. Where the cord guide G is arranged to oscillate sidewise with respect to the pulley, these spaces are such that the cord can be compressed and inserted sidewise through them by oscillating the guide G as indicated in Fig. 8. After the cord C has been compressed and inserted through the space 57 between the ends of fingers 46 and 47, the guide G is oscillated to one side and the cord forced between guide flange 44 and the rim of the pulley. With the cord in place in the pulley groove on this side, the cord guide is then oscillated in the opposite direction and the other branch of the cord similarly inserted. When the cord guide is so made as to be non-oscillatory, the spacing at 55 and 56 is such that the cord can, upon compression, be inserted sidewise between the guide flanges 44 and 45 and the rim of the pulley without the cord guide oscillation shown in Fig. 8.

In compliance with the patent statutes I have disclosed the best form in which I have contemplated applying my invention, but it will be understood that the disclosure is illustrative of the invention without limiting the scope of the same.

What is claimed is:

1. A Venetian blind tilter comprising: a worm-and-gear assembly, the gear having a formation which engages the worm and prevents complete rotation of the gear; a drive shaft on which the worm is mounted; a cord operated pulley rotatable on said drive shaft; and means to operatively couple the pulley to the drive shaft whereby rotation of the pulley imparts movement to the gear when the gear is free to rotate, said coupling means including a friction disc non-rotatably mounted on the drive shaft and frictionally engaging a peripheral zone of the pulley whereby the pulley cord is adjustable by forcibly rotating the pulley relative to the shaft when the worm is not free to rotate.

2. A Venetian blind tilter comprising: a worm-and-gear assembly, the gear having a formation which engages the worm and prevents complete rotation of the gear; a drive shaft on which the worm is mounted; a cord operated pulley rotatable on said drive shaft; and means to operatively couple the pulley to the drive shaft whereby rotation of the pulley imparts movement to the gear when the gear is free to rotate, said coupling means including a spring disc non-rotatably mounted on the drive shaft and frictionally engaging a peripheral zone only of the pulley whereby the pulley cord is adjustable by forcibly rotating the pulley relative to the shaft when the worm is not free to rotate.

3. A Venetian blind tilter comprising: a worm-and-gear assembly including means to arrest rotation of the gear; a drive shaft on which the worm is mounted; a cord operated pulley rotatable on said drive shaft, one axial face of the pulley having an annular recess surrounding the drive shaft whereby the pulley is provided with a salient peripheral zone; and means to operatively couple the pulley to the drive shaft whereby rotation of the pulley imparts movement to the gear when the gear is free to rotate, said coupling means including a springy disc frictionally engaging said salient peripheral zone, the center of the disc being biased toward said annular recess, and the pulley being forcibly rotatable relative to the drive shaft to adjust the pulley cord.

4. In a Venetian blind: a worm-and-gear assembly for tilting the slats of the blind, there being means to arrest rotation of the gear; a drive shaft on which the worm is mounted; a cord operated pulley rotatable on said drive shaft; and means to operatively couple the pulley to the drive shaft whereby rotation of the pulley imparts movement to the gear when the gear is free to rotate, said coupling means including a friction drive whereby the pulley cord is adjustable by forcibly rotating the pulley relative to the shaft when rotation of the gear is arrested.

5. In a Venetian blind: means for tilting the slats of the blind, there being means to arrest the movement of said tilting means; a cord operated pulley; and means to operatively couple said pulley to said tilting means whereby rotation of the pulley actuates the tilting means when the same is free to move, said coupling means including a frictional driving connection whereby the pulley cord is adjustable by forcibly rotating the pulley relative to the tilting means when movement of the tilting means is arrested.

6. In a Venetian blind: a worm-and-gear assembly, there being means to arrest rotation of the gear; a drive shaft on which the worm is mounted; a cord operated pulley rotatable on said drive shaft, each axial face of the pulley having an annular recess surrounding the drive shaft whereby each face of the pulley is provided with a salient peripheral zone; and means to operatively couple the pulley to the drive shaft whereby rotation of the pulley imparts movement to the gear when the gear is free to rotate, said coupling means including a friction drive whereby the pulley cord is adjustable by forcibly rotating the pulley relative to said drive shaft when rotation of the gear is arrested, said friction drive including a collar affixed to the drive shaft and nesting into one of said pulley recesses, and an axially stressed disc affixed to the drive shaft and

engaging the peripheral zone of the pulley on the face opposite to said collar.

7. A Venetian blind tilter comprising: two stamped sheet metal shells, each having a flat face portion, a gear-receiving depression adjacent to the bottom of the stamping, a channel open at both ends and connecting the depression with the top of the stamping, and a shaft-receiving recess extending crosswise of the channel, the two sheet metal shells being secured together in face-to-face relationship with said depressions, channels and recesses in registration; a shaft journalled in said shaft-receiving recesses; a gear in said gear receiving depressions; a worm meshing with said gear, the worm being affixed to said shaft and being positioned in said channels; and a one-piece dished lubricant-retaining member nesting with the lower portion of said gear-receiving recess and effective to retain lubricant in the recess regardless of leaky assembly of said sheet metal shells.

8. A Venetian blind tilter comprising: two stamped sheet metal shells secured together; a worm-and-gear assembly embraced and supported by the shells, the worm-and-gear being adjacent to the bottom of the shells; and a lubricant-retaining dish member nesting with the lower portion of said shells to hold lubricant in contact with one of said gear elements regardless of leaky assembly of said sheet metal shells.

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