Jan. 6, 1942. H. K. LORENTZEN 2,269,213

VENETIAN BLIND TILTER

Filed June 11, 1941 2 Sheets-Sheet 1

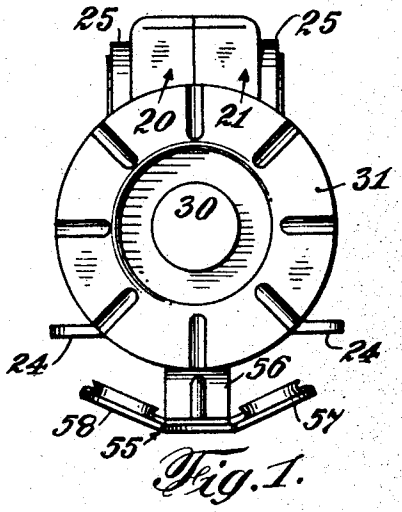


Fig. 1.

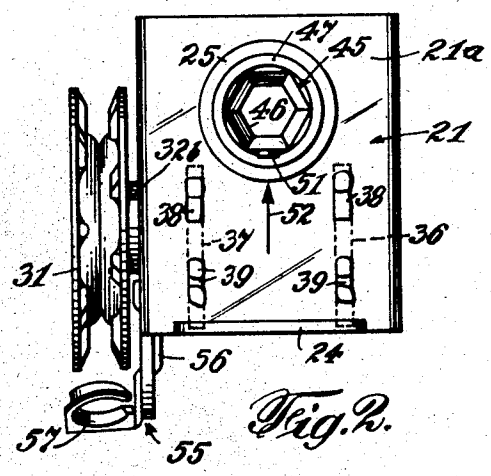


Fig. 2.

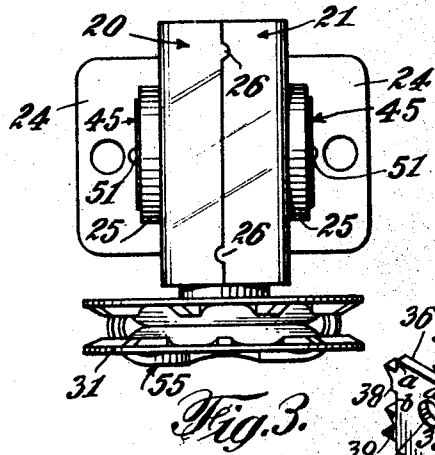


Fig. 3.

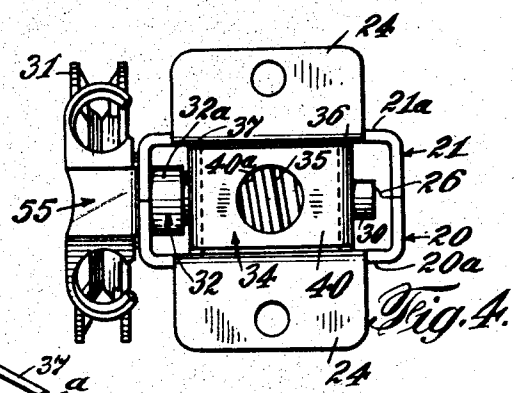


Fig. 4.

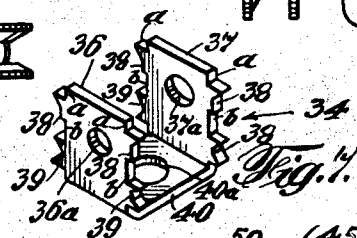


Fig. 7.

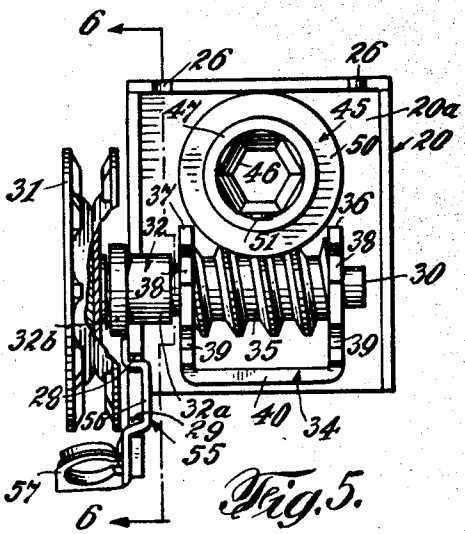


Fig. 5.

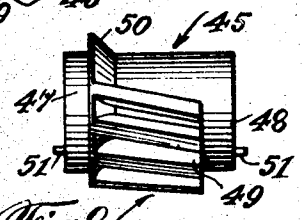


Fig. 8.

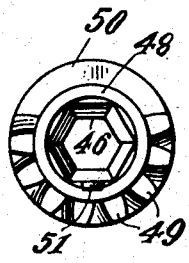


Fig. 9.

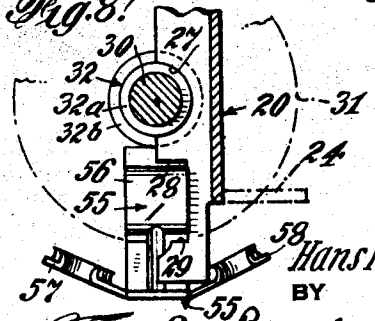


Fig. 6.

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VENETIAN BLIND TILTER

Filed June 11, 1941 2 Sheets-Sheet 2

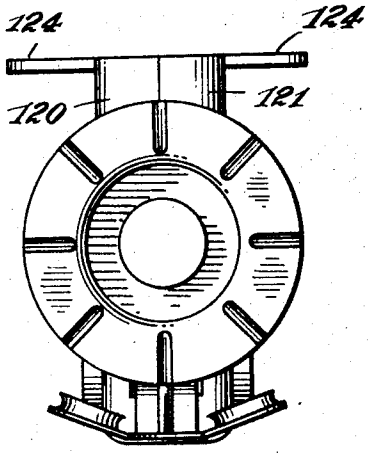


Fig. 10.

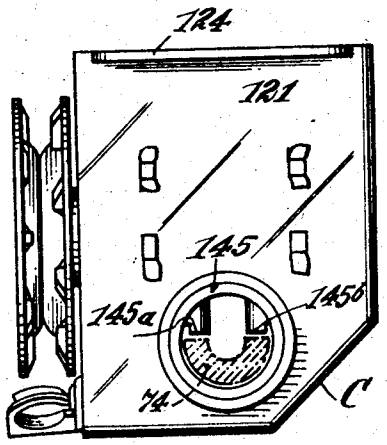


Fig. 11.

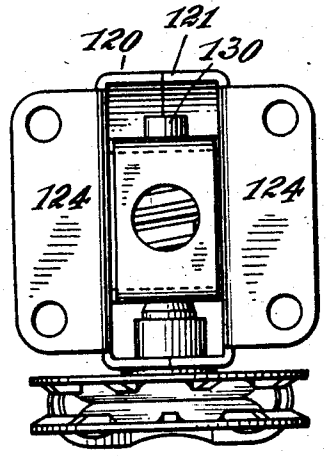


Fig. 12.

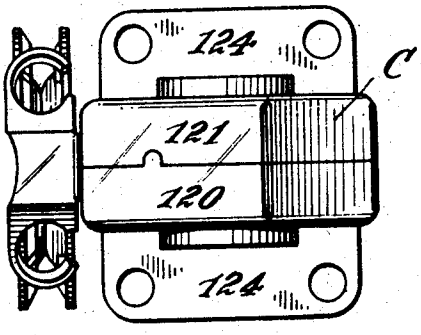


Fig. 13.

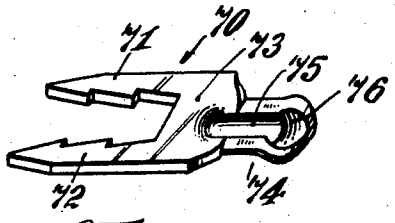


Fig. 14.



Fig. 16.

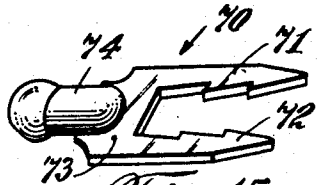


Fig. 15.

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UNITED STATES PATENT OFFICE

2,269,213

VENETIAN BLIND TILTER

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Application June 11, 1941, Serial No. 397,535

9 Claims. (Cl. 156—17)

This invention relates to Venetian blind tilters, and it is particularly applicable to tilters of the worm-and-gear type.

The general object of the invention is to provide an improved tilter which encloses the operating mechanism and which is adapted to low cost quantity production.

Another object of the invention is to provide an enclosed tilter adapted for manufacture largely from stamped sheet metal parts, and adapted to provide uniformly reliable and sturdy tilters when made on a quantity production basis.

A still further object of the invention is to provide a rugged, reliable, and inexpensive tilter adapted to be produced on a quantity production basis largely from stamped sheet metal parts.

Various other and detailed objects of the invention will be obvious from the following disclosure of two forms of tilters exemplifying the invention.

Fig. 1 of the drawings is a front elevation of a so-called "up-side-down" tilter embodying the present invention.

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

Fig. 3 is a top plan view of the tilter shown in Fig. 1.

Fig. 4 is a bottom plan view of the tilter shown in Fig. 1.

Fig. 5 is a view corresponding to Fig. 2 but showing the tilter as it would appear with the near section of the housing removed and showing part of the pulley in section.

Fig. 6 is a fragmentary partly diagrammatic vertical section taken in general on the line **6—6** of Fig. 5.

Fig. 7 is an isometric view of bridging means which tie the housing members together and provide a bearing for the worm shaft.

Fig. 8 is a side elevation of the worm-driven gear which is incorporated in the tilter.

Fig. 9 is an end elevation of the gear shown in Fig. 8, looking from the right of Fig. 8.

Fig. 10 is a front elevation of a so-called "right-side-up" tilter embodying the present invention.

Fig. 11 is a side elevation of the tilter shown in Fig. 10.

Fig. 12 is a top plan view of the tilter shown in Fig. 10.

Fig. 13 is a bottom plan view of the tilter shown in Fig. 10.

Fig. 14 is an isometric view of a connector member used with the tilter shown in Figs. 10 through 13.

Fig. 15 is a second isometric view of the connector member, the connector being shown in a turned-over position with respect to the position shown in Fig. 14.

Fig. 16 is an end view of the connector member, looking from the left of Fig. 15.

Reference will first be had to Figs. 1 through 9. A pair of complementary flat bottomed shells, designated as a whole by **20** and **21**, may be conveniently described as "cup-like," though the bottoms **20***a* and **21***a* of the cup formations are rectangular and only three side walls extend to the mouth of each cup formation. These shells fit together mouth-to-mouth and enclose an intervening space in which is mounted a worm-and-gear unit. Each of the cup-like shells may be made of stamped sheet metal, and each is provided with a perforated mounting flange **24** to be screwed on top of a suitable support, e. g. on top of the bottom wall of an enclosed headbar. From the bottoms **20***a* and **21***a* of the cup formations, there project outwardly tubular bosses **25**, **25** which act as bearings for the worm-driven gear or gear-sector. At **26**, **26** (Figs. 3 and 4) the two cup-like shells are provided with interfitting tongue-and-groove formations which assist in registering the two shells in mouth-to-mouth relationship. Each of the shells **20** and **21** is provided with a semicircular cut-out as at **27** (Fig. 6) and with notches **28** and **29**, all of which register respectively when the two shells are in mouth-to-mouth contact.

On the end of a drive shaft **30** there is affixed a cord pulley **31** for rotating the shaft. Telescoped onto the shaft and adjacent to the pulley is a bearing collar **32** made of suitable bearing metal. This bearing collar has a tubular shank portion **32***a* adapted to act as a bearing for the shaft **30**, and has an annular flange portion **32***b* adapted to act as a thrust bearing and/or to prevent excessive longitudinal motion of the bearing collar on the shaft **30**. After the bearing collar has been put in place on the shaft, there is telescoped onto the shaft a U-shaped member, designated as a whole by **34**, between the legs of which there is placed a worm **35** that is telescoped onto the shaft **30** at the same time. Shaft **30** is provided with suitable projections or serrations (not shown) over which the worm **35** is forced and which appropriately attach the worm to the shaft.

The U-shaped member **34** is a sheet metal stamping; and its legs are formed as bridge members **36** and **37** which bridge the space between the bottoms **20***a* and **21***a* of the two cup formations **20** and **21**. The edges of bridge

members 36 and 37 are provided with single-nosed projections 38 (four shown) and with double-nosed projections 39 (four shown). In assembly, these projections pass through rectangular holes in the bottoms 20a and 21a of the cup formations 20 and 21, the noses of the projections 38 and 39 being then upset or riveted to secure the shells 20 and 21 in mouth-to-mouth relationship. When so assembled, shoulders a and b of the bridge members preferably abut against the bottoms 20a and 21a of the cup formations. Bridge member 36 has a hole 36a (Fig. 7) which acts as a bearing for the end of shaft 30 remote from the pulley. Bridge member 37 has a larger hole 37a which clears the shaft so that collar 32 can properly act as a bearing for the pulley end of shaft 30. The bottom 40 of the U-shaped member may be provided with a hole 40a, through which the worm 35 can be inspected or oiled (see Fig. 4).

A worm gear (or gear sector) designated as a whole by 45 has an axial hexagonal hole 46 to telescopically receive a hexagonal connector member, or the end of a hexagonal rod, to transmit tilting movement to a Venetian blind with which the tilter is used. As shown in the drawings, the gear 45 is a cast one, with the result that the hexagonal hole 46 has its minimum size at the center with draft each way from the center to the ends of the gear. The ends of the gear are provided with cylindrical bearing portions 47 and 48 between which are the teeth 49. Cast integral with the teeth at one end thereof is an annular strengthening flange 50. In the case of a full gear, which may be used in the tilter, the teeth 49 extend entirely around the periphery of the gear. As shown in the drawings, however, the teeth extend only partially around the periphery of the gear, thereby constituting a gear sector. A gear sector is used when the tilter is constructed for automatic cord adjustment according to Nelson Patent 2,174,994, dated October 3, 1939. Projecting from the two ends of the gear are aligned indexes 51, 51. When the tilter is one for automatic cord adjustment, the gear sector is so rotated at the time the pulley cord is to be applied that an index 51 is opposite a mark such as arrow 52 (Fig. 2) on the outside of the casing. Then the cord is so applied that the free ends of the cord hang at the same level. Each of the shells 20 and 21 is provided with a suitable mark such as arrow 52, and each end of the gear 45 is provided with an index point 51 so that the setting of the tilter can be made by looking at either side of the tilter.

Beneath the pulley 31 there is a cord guide, designated as a whole by 55. This is a unitary sheet metal stamping having a zigzag generally vertical portion 56. On the bottom of this vertical portion there are two open cord loops 57 and 58 into which the pulley cord can be inserted, as described in my copending application S. N. 353,020, filed August 17, 1940. The zigzag formation of the generally vertical portion 56 is such as to enable the vertical portion to pass laterally through aligned grooves 28 and aligned grooves 29 in the edges of the cup formations 20 and 21.

In assembly, there is placed in shell 20 the previously made assembly of pulley 31, shaft 30, bearing collar 32, stamping 40, and worm 35. In so placing this assembly into shell 20, the bearing collar 32 is received by one of the semicircular cut-outs 27, and the projections 38 and 39 on one edge of bridge members 36 and 37 are inserted through the openings provided in the bottom 20a of the cup formation constituting shell 20. Thus, shaft 30 projects outside of the housing so that the pulley is outside of the housing. Gear 45 is then inserted with its cylindrical portion 48 telescoped into the annular boss 25 of shell 20. Cord guide 55 is inserted, as shown in Figs. 5 and 6, with the offsets in vertical section 56 in place in notches 28 and 29. The other cup-like shell 21 is then put in place in mouth-to-mouth engagement with shell 20. This cup-like shell 21 also has a semicircular cut-out, as at 27, which embraces the other half of bearing collar 32; has corresponding notches which register with notches 28 and 29 to hold the cord guide 55; and has four rectangular holes through which the projections 38 and 39 on the other edges of bridge members 36 and 37 pass. Thus assembled, all of the eight projections 38 and 39 have their noses upset or riveted; and this holds the tilter in fixedly assembled condition. In assembly, alignment of the two shells 20 and 21 is facilitated by the tongue and groove formations at 26, 26 and also by the cord guide 55 which engages with the notches 28 and 29 of both of the shells.

The construction of the so-called "right-side-up" tilter shown in Figs. 10 through 13 is similar to that of the so-called "up-side-down" tilter shown in Figs. 1 through 9; and the similarity is so great that the "right-side-up" tilter will be clearly understood by considering the major differences between it and the "up-side-down" tilter which has already been described.

In the "right-side-up" tilter the mounting flanges 124, 124 are at the top, so that the tilter can be screwed to the bottom of a head-bar from which the tilter will depend. The worm shaft 130 is above the gear 145, instead of in the inverse relation shown in Figs. 1 through 6. The cup-like shells 120 and 121 are so shaped as to chamfer the housing at C, to give clearance when the tilter is mounted. The gear 145 may be either a full gear or a gear-sector; and it differs from gear 45 (Figs. 8 and 9) only in the shape of the axial opening, which is shaped to receive a so-called "mushroom" connector shown in Figs. 14, 15 and 16.

The connector 70 of Figs. 14, 15 and 16 is a unitary sheet metal stamping having toothed legs 71 and 72 that are adapted to be driven into the end of a wooden tilt bar. These legs project in one direction from a body portion 73; and a mushroom stem 74 projects in the other direction from the body portion. Stamped into stem 74 is a groove 75 and deeper depression 76, which give the stem a semicircular contour with an enlarged end.

As shown in Fig. 11, the axial opening in gear 145 has longitudinal ridges 145a and 145b against which the flat faces of connector stem 74 rest when the connector is telescoped into the gear.

Gear 145 is interchangeable with the gear 45 so that either form of gear can be used in either form of tilter. Thus, either the "up-side-down" or the "right-side-up tilter" can be made for cooperation with either a hexagonal driven rod or with a mushroom connector of the type shown in Figs. 14, 15 and 16. Also the gear can be made with any other desired form of axial opening to cooperate with any form of connector that it may be desirable to use.

The collar 32 is made of suitable bearing metal such as brass or bronze. I have also successfully

used a bearing collar of compressed powdered metal containing a lubricant so that this collar is self-lubricating.

Worm 35 and gears 45 and 145 may be made of suitable metal such as brass or bronze, and preferably the gear is made of a metal softer than that of the worm. One combination of metals that I have successfully used is brass for the worm and commercial die cast metal (which is zinc or predominantly zinc) for the gears 45 and 145. Gears of this commercial die cast metal are preferably specially treated to give them increased wearing qualities and self-lubricating qualities. A treatment which I have successfully used is as follows.

The die cast gears are first cleaned in a hot alkali rinse for which I have used a solution of five to six ounces of commercial "Swish" cleaner per gallon of water, the solution being used at a temperature close to the boiling point. After three or four minutes in this alkali rinse, the gears are removed and washed in water at room temperature. Then the gears are immersed in a weak hydrochloric acid solution, which I have made by adding technical twenty percent hydrochloric acid to an equal volume of water at room temperature. The time of treatment with the acid varies from a fraction of a minute to several minutes, depending upon the strength of the acid. The acid treatment should be continued long enough to blacken the gears to a dull black, but not long enough to undersize the gears through dissolving action. After the acid treatment the gears are thoroughly rinsed in hot water. Then the gears are immersed from ten to fifteen minutes in a liquid sold on the market under the name of "Black Magic" dip or die cast black. This hardens the black coating or surface of the gears. The gears are now rinsed in water at room temperature. Finally, the gears are dipped for three or four minutes in a hot oil dip, for which purpose I have used a water miscible oil sold under the name of "Hocut." In popular parlance this oil is miscible with water, though it may be a mixture in the nature of an emulsion. This oil I have used in the proportion of one gallon of oil to two gallons of water, the mixture being at a temperature where it is almost white.

In the above treatment the acid apparently imparts a certain amount of surface porosity to the gear. In the final step the hot oil soaks into the gears, giving them a shiny finish and self-lubricating qualities.

In compliance with the patent statutes, I have disclosed the best forms in which I have contemplated applying my invention, but it will be understood that the disclosures are illustrative of the invention rather than limiting the scope thereof.

What I claim is:

1. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two flat-bottomed cup-like shells of sheet metal, the cup formations having mouths formed by the edges of the sheet metal and the two cup formations being secured together with the mouths in edge-to-edge contact; bridge members extending from one of said shells to the other; and said shaft being journalled in one of said bridge members.

2. In a Venetian blind tilter of the type in which is a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two cup-like shells positioned mouth-to-mouth, and bridge members extending between the bottoms of the two cup formations and acting to secure the two shells together.

3. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two cup-like shells positioned mouth-to-mouth, bridge members extending between the bottoms of the two cup formations and acting to secure the two shells together, and said shaft being journalled in one of said bridge members.

4. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two housing members which fit together and leave an internal space, bridge means extending between said housing members and across said internal space, said bridge means being attached to the housing members and acting to secure the housing members together.

5. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two housing members which fit together and leave an internal space, bridge means extending between said housing members and across said internal space, said bridge means being attached to the housing members and acting to secure the housing members together, and said shaft being journalled in said bridge means.

6. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two housing members which fit together and leave an internal space, and two flat bridge members extending between said housing members and across said space, the bridge members having shoulders positioned adjacent to the interior of the housing members and having projections extending through the housing members and distorted to secure the bridge members to the housing members and thereby secure the housing members together.

7. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two housing members which fit together and leave an internal

space, and two flat bridge members extending between said housing members and across said space, the bridge members having shoulders positioned adjacent to the interior of the housing members and having projections extending through the housing members and distorted to secure the bridge members to the housing members and thereby secure the housing members together, said shaft being journalled in one of said bridge members.

8. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the housing being formed by two housing members which fit together and leave an internal space, and two flat bridge members extending between said housing members and across said space, the bridge members having shoulders positioned adjacent to the interior of the housing members and having projections extending through the housing members and distorted to secure the bridge members to the housing members and thereby secure the housing members together, said bridge members being parts of a single unitary sheet metal stamping.

9. In a Venetian blind tilter of the type in which a worm-and-gear unit is mounted in a housing, the worm being on a shaft which projects outside of the housing, and the shaft being provided with a drive pulley located outside of the housing; the improvement which comprises: the tilter including a premade sub-assembly of pulley, shaft, bearing collar, worm, and bridge members; and the housing being formed by housing members attached to said bridge members.

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