Dec. 25, 1945. J. NISENSON 2,391,500

VENETIAN BLIND TILTER

Filed Feb. 5, 1944

Fig. 2

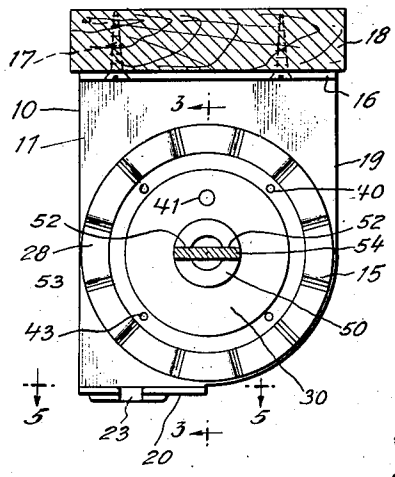


Fig. 1

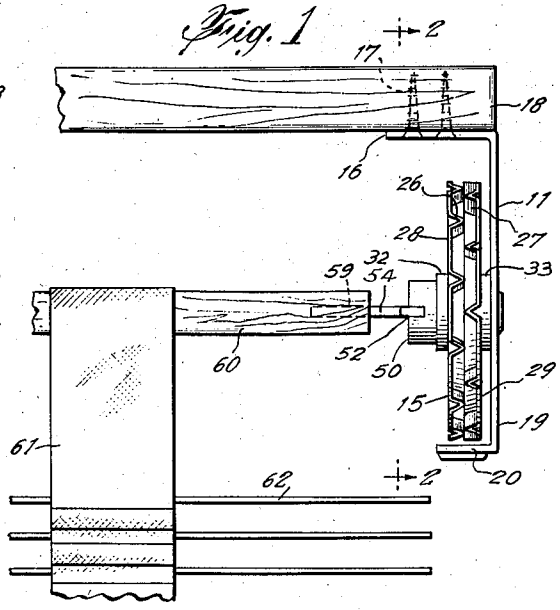


Fig. 3

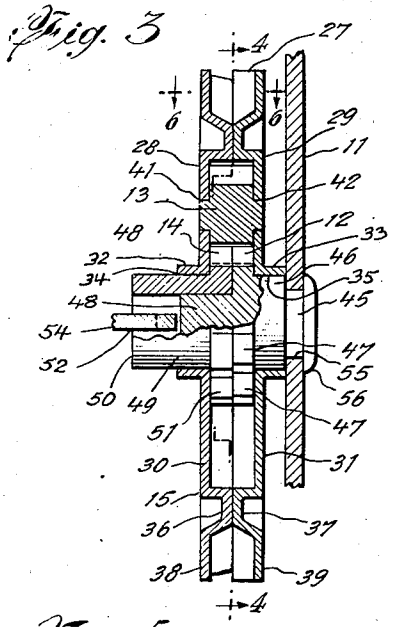


Fig. 4

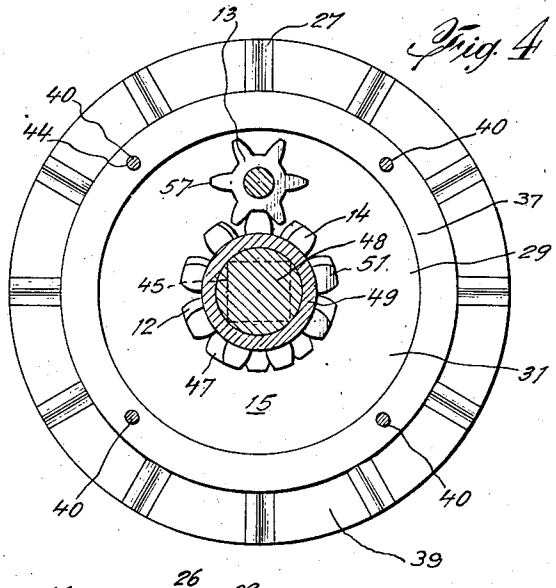


Fig. 5

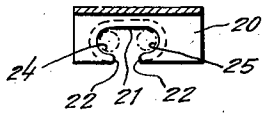


Fig. 7

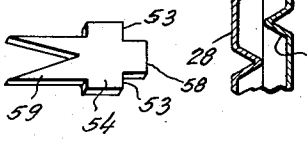


Fig. 6

INVENTOR.
Jules Nisenson
BY
Richard S. Temko
attorney

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2,391,500

VENETIAN BLIND TILTER

Jules Nisenson, New York, N. Y., assignor to Publix Metal Products Inc., New York, N. Y., a corporation of New York

Application February 5, 1944, Serial No. 521,200

20 Claims. (Cl. 160—176)

This invention relates generally to the Venetian blind art and more particularly to a device for tilting the slats, frequently referred to in the art as a tilter.

Among the objects of the present invention lies the provision of a tilter which is extremely compact and light in weight. A reduction in the weight of the parts as compared with prior art structures results in economies in manufacture, storage and shipping; while the reduction in bulk of the tilter makes for a neater appearance and the inconspicuousness thereof reduces the need for valance boards or similar concealing means.

Another object herein is the provision of a unitary tilting mechanism which requires only to be shifted from one end of the head bar to the other so that the same may be utilized to actuate a tilt bar from either the left or right side or end thereof.

Another object herein lies in the provision of a tilting mechanism which is readily actuated by cord or chain and in which the means for the supporting and guiding of the cord or chain in operative connection with the main driving pulley is integral with the support bracket.

A still further object of the invention is the provision of a tilter requiring a minimum of parts, which are either stampings or die castings, and which require a minimum of labor and expense to assemble.

Another object herein lies in the provision of a tilter in which a step down gear ratio is provided between the main pulley and the connection to tilt bar without the use of a worm.

A still further object of the present invention is the provision of a device of the class described in which the tilt bar and/or the movable gear associated therewith becomes automatically locked in any adjusted position thereof.

An advantage of the present structure lies in the fact that substantially all of the moving parts are enclosed. They may thus have a quantity of lubricant associated therewith and dirt and moisture are prevented from coming into contact with said parts.

A further object herein lies in the provision of structure which is simple, strong, and efficient; and smooth and foolproof in operation.

These objects and further features and advantages will more fully appear in the progress of this disclosure and be pointed out in the appended claims.

In the accompanying drawing, similar reference characters designate corresponding parts throughout the several views in which:

Figure 1 is a fragmentary front elevational view showing a tilter attached to a head bar and engaging a tilt bar which supports slats. In this figure, the cord or chain is removed for the purpose of clarity.

Figure 2 is a fragmentary sectional view as seen from the plane 2—2 on Figure 1, showing the tilter in end elevation.

Figure 3 is an enlarged fragmentary vertical sectional view partly in elevation as seen from the plane 3—3 on Figure 2. In this figure, the fragmented tilt bar connector is shown as engaging the coupling therefor on the movable gear.

Figure 4 is a vertical sectional view partly in elevation as seen from the plane 4—4 on Figure 3.

Figure 5 is a fragmentary horizontal sectional view as seen from the plane 5—5 on Figure 2.

Figure 6 is a horizontal sectional view as seen from the plane 6—6 on Figure 3.

Figure 7 is a view in perspective of the connector element.

In accordance with the invention, the tilter generally indicated by numeral 10 includes a support bracket 11, a first or stationary gear 12, a pinion 13, a second or movable gear 14, and a pulley 15.

The bracket 11 includes an attaching flange 16 which may be suitably orificed so that it may be attached by means of the screws 17 in a well known manner to the head bar 18. The attaching flange is preferably disposed at right angles to the body or frame 19 of the bracket 11. The lowermost portion of the bracket 11 has a right angle tab 20 integral therewith which is bent from the bracket 11 in the same general direction as the flange 16. The tab 20 forms the chain or cord guide and is provided with an irregular shaped indentation 21, best seen in Figure 5. The indentation 21 has an entrance 23 disposed between two short fingers 22. The fingers 22 are directed toward each other and are oppositely disposed and the distance between them is preferably equal to or slightly less than either of the cords 24 or 25. The cords 24 and 25 are indicated schematically in dot and dash outline on Figure 5. Thus when the cords are placed upon the pulley 15 in the first instance or removed therefrom, they may be snapped or pushed through the entrance 23 between the fingers 22 by slightly compressing the cords. After the cords are in place either of the cords 24 or 25 hinders the removal of the other, and they are not easily accidentally displaced. The disposition of the cord guide 20 in relatively close proximity to the periphery of the pulley 15 serves to properly position the bight

(not shown) of the cord so that the cord may properly engage in a serpentine manner between the several alternately arranged ribs 26 and 27 on the pulley discs 28 and 29.

The pulley discs are substantially identical and include central portions 30 and 31 having outwardly directed necks 32 and 33, central orifices 34 and 35, oppositely and inwardly depressed connecting and spacing portions 36 and 37, and peripheral cord engaging portions 38 and 39. The portions 36 and 37 may be interconnected in any suitable manner as for example by spot welding or by a plurality of rivets 40.

The pulley discs 28 and 29 in the central portions 30 and 31 thereof are provided with orifices 41 and 42 within which the pinion 13 is trunnioned. The ribs 26 and 27 are so arranged with relation to each other and with the orifices 41 and 42 as well as the orifices 43 and 44, that when the pulley discs 28 and 29 are interconnected with the said orifices oppositely disposed and axially aligned they will be alternately arranged to provide a serpentine path for the cord. Obviously it is necessary that the orifices 43 and 44 in the pulley discs 28 and 29 for the penetration of the rivets 40 be so arranged that they are in alignment with the orifices 41 and 42 are coaxially alined. The pulley discs 28 and 29 may be constructed of stamped sheet metal.

The first or stationary gear 12 is preferably a die casting although the same may be fabricated by any other suitable manufacturing process and includes a boss 45, a cylindrical pulley disc bearing portion 46, a ring of gear teeth 47, and a hub 48.

The second or movable gear 14 is in the form of a hollow cylinder including a body 49, a coupling portion 50 and a radially disposed ring of second gear teeth 51. The coupling portion 50 is provided with a pair of oppositely disposed slots 52 which are adapted to receive the wings 53 of the connector element 54. The body or frame 19 of the support bracket 11 is provided with an orifice 55 within which the boss 45 is a close or drive fit. The boss 45 in its fabricated state is of greater length than the thickness of the body 19 so that after said boss has been placed or driven into the orifice 55, the terminal thereof may be swaged over to form the head 56. It is necessary in the operation of the device 10 that the gear 12 be substantially stationary with respect to the bracket 11 and to further accomplish this purpose, the boss 45 may have a non-circular external configuration and the orifice 55 may be correspondingly shaped. As seen in Figure 4, a desirable polygonal shape for the boss 45 is shown. The effective diameter of the body 49 and of the bearing portion 46 are substantially equal to each other and are such as to provide a running fit within the necks 32 and 33 of the pulley discs 28 and 29 respectively. The hub 48 has an effective diameter substantially equal to or slightly less than the internal diameter of the body 49 so that the same has a running fit therein. Thus the stationary gear 12 acts as an axle about which the pulley 15 is rotatable as a unit and the hub 48 of the stationary gear 12 acts as an axle for the movable gear 14, and the body 49 of which acts as an axle for the pulley 15. The body 49 therefore, is supported radially outwardly thereof by the neck 32 and radially inwardly thereof by the hub 48. The thickness of the ring of first gear teeth 47 and the thickness of the ring of second gear teeth 51 together are substantially equal to or slightly less than the distance between the inner opposed surfaces of the central portions 30 and 31 of the pulley 15. Thus the pulley disc 29 is rotatably guided into position by being disposed between the body 19 of the bracket 11 on one side and the nearest surfaces of the ring of first gear teeth 47 on the other side.

The teeth 47 and the teeth 51 are of substantially identical pitch diameter. The pinion 13 on the other hand has the teeth thereof preferably of a lesser pitch diameter. The gears and pinion are preferably of the straight tooth spur gear type. The gears 12 and 14 differ in circular pitch preferably by one tooth so that the stationary gear 12 may have for example ten teeth, while the movable gear 14 may have nine teeth. The pinion may have any desired number of teeth 57 but it is desirable that the pitch diameter of the pinion be relatively small so that the pulley discs and particularly the central portions thereof 30 and 31 need not be of any greater diameter than is necessary to clear the outermost sweep or tip circle of the teeth 57. The circular pitch of the teeth on the pinion will therefore be governed by the number of teeth which may be fitted into the pitch circle of the pinion with the tip circle taken into consideration. The size of the individual teeth 57 along the pitch circle is preferably such that they may mesh simultaneously between a pair of teeth of the ring of teeth 47 and another pair of teeth of the teeth 51.

Thus if the teeth 57 are of such a size as to properly mesh with the gear having the greater number of teeth, namely the gear 12, then the teeth 57 will be a looser fit between the teeth 51 on the gear 14 having the lesser number of teeth. This slight amount of play, however, is not sufficient so as to be objectionable.

With the gears assembled and in mesh with the pinion, the chamber formed by the central portions 30 and 31 may have therein a quantity of lubricant such as grease, and since the pulley 15 is rotated in normal use thereby carrying the pinion around the gears such lubricant will be evenly and satisfactorily distributed.

As seen in Figure 7, the connector element 54 includes a head 58 which is of sufficient width so as to form a sliding fit within the coupling portion 50. The ears 53 are preferably of a size and shape so that they nest within the slots 52 which are correspondingly sized and shaped.

The plural prongs 59 may be driven into the tilt bar 60. The tilt bar may carry the usual tapes 61 and slats 62.

With the device fully assembled and installed as shown in Figure 1, the operation thereof is relatively simple and efficient. The pulley 15 may be rotated in either direction by the cords 24 and 25 in a well known manner and such rotation of the pulley carries the pinion 13 around with it. Since the pinion 13 is in mesh with the stationary gear 12, it rotates with relation to itself about its own axis as well as about the axis of the pulley 15. In making a complete rotation of the pulley 15, the pinion will have engaged each of the ten teeth 47. Since the teeth 51 must go along with the pinion teeth 57 with which they are engaged, the movable gear 14 will move with respect to the stationary gear 12 a distance equivalent to the pitch of the movable gear and since in the embodiment shown there are nine teeth 51 there will be a nine to one step down ratio between the pulley 15 and the movable gear 14 and hence also the coupling portion 50. This step down ratio permits a very fine adjustment of the tilt bar when the connector element articulately in-

terconnects the tilt bar 60 with the coupling portion 50.

Since the pinion moves about the stationary gear only by revolving itself, torque applied to the coupling portion 50 will be transmitted through the teeth 51 to the pinion 13. The pinion however engages the stationary gear teeth 47 so it cannot revolve unless the pulley is revolved. Thus there is a one way action and the tilt bar and slats connected thereto are securely locked in any adjusted tilted position thereat in a manner which obtains in any worm and gear tilters well known in the art.

It may thus be seen that I have provided a novel and useful Venetian blind tilter which possesses the characteristics of adequate step down ratio, one way drive from pulley to chuck or coupling with locking action in the reversed direction, and smooth operation. These characteristics are possessed by the worm and the gear type of tilter but I obtain them with a reduced cost of production and a compact internally lubricated enclosed structure.

By virtue of the compactness and unobtrusiveness of my improved tilter and by virtue of the fact that the pulley may be rotated about an axis which is concentric with the axis of rotation of the tilt bar, the tilter may be located very close to the bracket 11 and valance boards normally used for concealing such mechanism may be dispensed with. In an ordinary tilter of the form and gear type it is usual to locate the pulley in the front of the tilter so that it rotates about an axis at right angles to the longitudinal axis of the tilt bar. The pulley in such construction is attached to a short shaft which carries the worm, and the worm in turn is disposed below a gear which rotates about an axis concentric with the axis of rotation of the tilt bar. If the pulley and worm are placed above the gear in such prior art construction, the pulley must be made small to avoid striking the head bar 18. If the pulley and worm are located at the lowermost portion of the gear, the pulley must be of small diameter in order not to interfere with the top slat 62. This reduction in the effective diameter of the pulley reduces the torque obtained therein by a given amount of pull upon the cord which engages the pulley. This in turn requires a greater step down ratio between the worm and gear in order to secure the same effective torque upon the tilt bar. In the present construction, the pulley since it is concentrically mounted with relation to the axis of rotation of the tilt bar may be of greater diameter since it is the radius of the pulley which measures the likelihood of the pulley or cord thereon striking or frictionally engaging the head bar 18 or the top slat 62. Thus, since the cord is located farther from the center a lesser step down ratio need be used to get the same effective torque at the tilt bar.

While the difference in the number of teeth between the stationary and movable gears may be greater than one tooth, this will require a greater reduction in the size of the teeth on the pinion with a consequent weakening of the pinion teeth.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a Venetian blind tilter: a first gear; a second gear movable with respect to said first gear; said second gear having a different number of teeth from said first gear; and a pinion orbitally rotatable about and meshing with said first and second gears.

2. In a Venetian blind tilter: a first gear; a second gear movable with respect to said first gear; said second gear having a different number of teeth than said first gear; and a pinion having at least one tooth thereof simultaneously in mesh with both of said gears.

3. In a Venetian blind tilter: a first gear; means non-rotatably mounting said first gear; a second gear movable with respect to said first gear, said second gear having a different number of teeth from said first gear; and a pinion meshing with said first and second gears.

4. In a Venetian blind tilter: a stationary gear; a movable gear having a different number of teeth from the stationary gear; a pinion meshing with both of said gears; and means to move said pinion.

5. In a Venetian blind tilter: a pair of annular gears coaxially mounted having different numbers of teeth, one of said gears being rotatable with relation to the other; and a pinion adapted for rotation about its own axis and rotatable as a unit about the axis of rotation of the rotatable gear.

6. In a Venetian blind tilter: a stationary frame; a first gear fixedly mounted on said frame; a second gear rotatably mounted with relation to the first gear, said second gear having a different number of teeth than the first gear; a pulley; and a pinion rotatably mounted on said pulley and simultaneously engaging both of said gears.

7. In a Venetian blind tilter: a first gear; a second gear movable with respect to the first gear; said second gear having a different number of teeth from the first gear; a pulley composed of a pair of plates; and a pinion meshing with said first and second gears, said pinion being trunnioned by and between said plates.

8. In a Venetian blind tilter: a bracket; a first gear fixedly mounted on said bracket; a second gear rotatably mounted on the first gear and having a different number of teeth than the first gear; a pulley rotatable with respect to said bracket; and a pinion rotatably carried by said pulley and engaging both of said gears.

9. In a Venetian blind tilter: a bracket; a first gear fixedly mounted on said bracket; a second gear having a different number of teeth than the first gear; a hollow pulley enclosing said gears; and a pinion rotatably mounted within the hollow pulley and movable as a unit with said pulley, said pinion meshing with both of said gears.

10. In a Venetian blind tilter: a pair of gears coaxially arranged and in side by side juxtaposition; and a hollow pulley enclosing said gears and coaxially rotatable thereabout.

11. In a Venetian blind tilter: a pair of gears coaxially arranged and in side by side juxtaposition; a hollow pulley enclosing said gears and coaxially rotatable thereabout; and said pulley being composed of a plurality of plates interconnected outwardly of said gears.

12. In a Venetian blind tilter: a first gear; a second gear having substantially the same pitch diameter as the first gear; one said gear being movable with relation to and having a circular pitch different from the other; and a pinion having at least one of its teeth simultaneously engaging each of said gears.

13. A Venetian blind tilter for use with a head

bar and a tilt bar, comprising: a bracket adapted to be secured to the head bar; a first gear secured to said bracket; a second gear connected to the tilt bar, and co-axially movable with respect to the first gear; and a pinion rotatably mounted with respect to itself and orbitally movable with respect to the axes of said gears.

14. A Venetian blind tilter for use with a head bar, a tilt bar, comprising: a bracket adapted to be secured to the head bar; a first gear secured to said bracket; a second gear detachably connectable with the tilt bar, and movable with relation to the first gear; a rotatable pulley; and a pinion rotatably mounted on said pulley and engaging said gears.

15. In a Venetian blind tilter: a first gear having a hub axially disposed; and a second gear having a hollow cylindrical body axially and rotatably disposed on said hub.

16. In a Venetian blind tilter: a bracket; a first gear having an axial hub projecting from one surface of said first gear and a boss projecting from the opposite surface of said first gear; said boss being secured to said bracket; and a second gear having a hollow cylindrical axial body; said second gear being rotatably supported by said hub.

17. In a Venetian blind tilter: a bracket; a first gear having an axial hub, and an axial bearing portion and boss, the boss being secured to said bracket; a second gear rotatably mounted on the hub of the first gear; a pulley formed of a pair of plates secured together, spaced at the central portion thereof and provided with a pair of oppositely disposed orifices; said gears being disposed between said plates, the border of the orifice in one plate forming a bearing on said bearing portion, the border of the orifice in the other plate forming a bearing on the second gear.

18. In a Venetian blind tilter: a first gear; a second gear; and a pulley including first and second plates enclosing said gears; each of said plates having an orifice; one of said plates being rotatably mounted on the first gear and the other of said plates being mounted on the second gear.

19. A device as claimed in claim 18 having a pinion trunnioned between said plates and meshing with said gears.

20. A device as claimed in claim 18 in which the first and second gears have a different number of teeth.

JULES NISENSON.