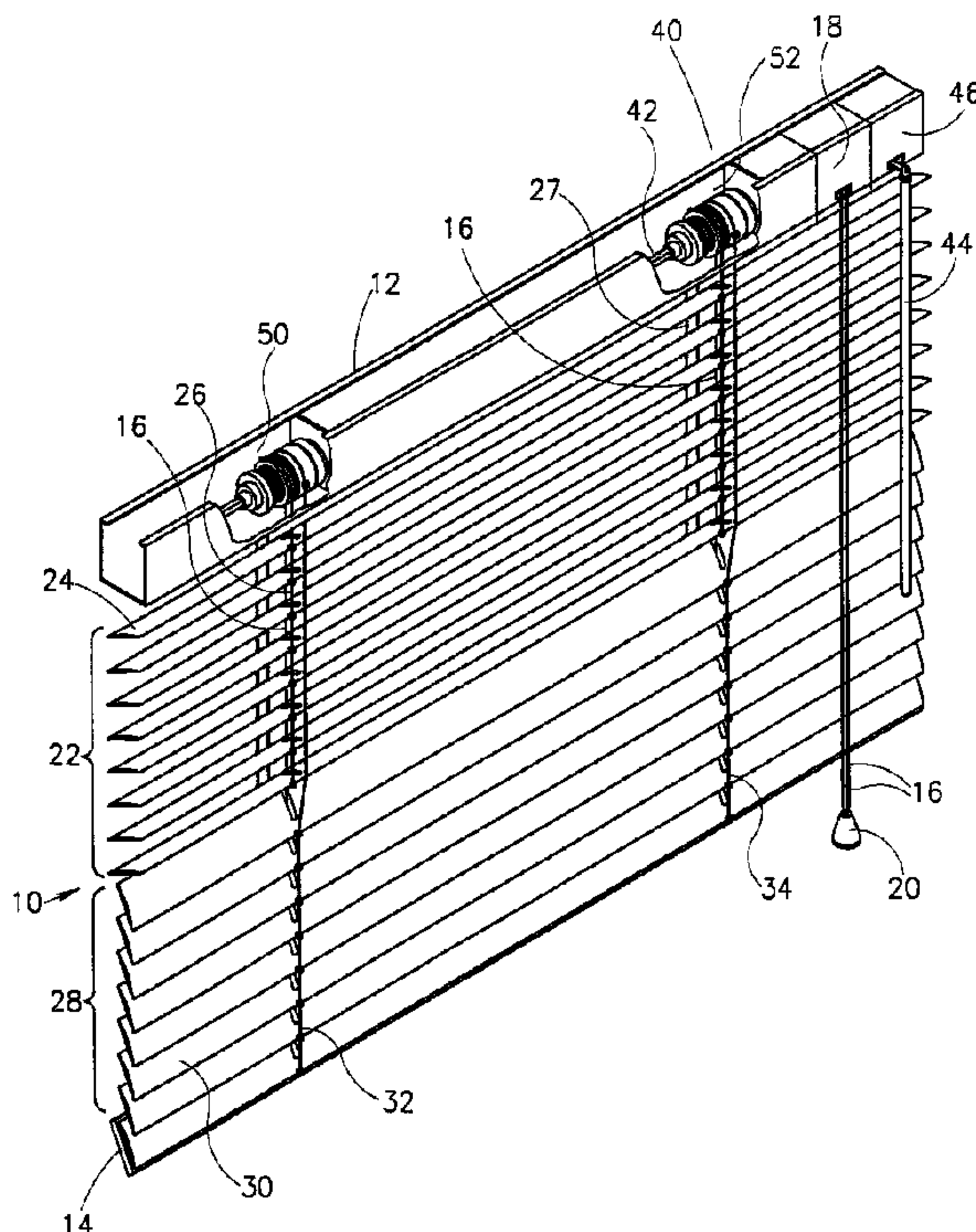




(22) Date de dépôt/Filing Date: 1998/06/09
 (41) Mise à la disp. pub./Open to Public Insp.: 1998/12/24
 (45) Date de délivrance/Issue Date: 2006/04/18
 (30) Priorité/Priority: 1997/06/24 (P9701393) ES

(51) Cl.Int./Int.Cl. *E06B 9/307* (2006.01),
E06B 9/322 (2006.01), *E06B 9/24* (2006.01)
 (72) Inventeur/Inventor:
PASTOR, VINCENTE MIGUEL SEGUI, ES
 (73) Propriétaire/Owner:
HUNTER DOUGLAS INDUSTRIES BV, NL
 (74) Agent: OGILVY RENAULT LLP/S.E.N.C.R.L.,S.R.L.

(54) Titre : MECANISME D'ORIENTATION POUR UN STORE VENITIEN
 (54) Title: TILTING MECHANISM FOR A VENETIAN BLIND



(57) **Abrégé/Abstract:**

A venetian blind comprising a top rail and a bottom rail, a first group of slats supported by at least two first ladders extending between the top and bottom rails, and a second group of slats supported by at least two second ladders extending between a top rail and a bottom rail and a tilt assembly comprising a tilting rod received within the top rail and operable by a manipulating rod or cord, a reversing mechanism associated with each of the at least one first and second ladders, each reversing mechanism being articulated to the tilting rod and fitted with a first plate and a second plate. Each one of the first ladders is connected to a corresponding first plate and each one the two second ladders is connected to a corresponding second plate. Rotation of the tilting rod entails rotation of the first plate and the second plate in the same direction, and further rotation of the tilting rod in the same direction entails rotation of the second plate in an opposite direction.

ABSTRACT

A venetian blind comprising a top rail and a bottom rail, a first group of slats supported by at least two first ladders extending between the top and bottom rails, and a second group of slats supported by at least two second ladders extending between a top rail and a bottom rail and a tilt assembly comprising a tilting rod received within the top rail and operable by a manipulating rod or cord, a reversing mechanism associated with each of the at least one first and second ladders, each reversing mechanism being articulated to the tilting rod and fitted with a first plate and a second plate. Each one of the first ladders is connected to a corresponding first plate and each one the two second ladders is connected to a corresponding second plate. Rotation of the tilting rod entails rotation of the first plate and the second plate in the same direction, and further rotation of the tilting rod in the same direction entails rotation of the second plate in an opposite direction.

TILTING MECHANISM FOR A VENETIAN BLIND

FIELD OF THE INVENTION

The present invention is generally in the field of venetian blinds and more specifically it is concerned with a tilting mechanism for controlling the tilt angle of separate groups of slats of a venetian blind.

5 BACKGROUND OF THE INVENTION

Venetian blinds comprise a plurality of slats horizontally supported by two or more ladders extending between a head or top rail and a foot or bottom rail. A chord is provided for elevating or lowering the blind to a lowermost or intermediate position.

- 10 It is often desirable to tilt the slats in order to darken a room to meet the requirements of individuals present in the room, or to prevent direct sun light from entering the room so as to avoid dazzling and possible damages caused by direct sun light, in particular by the ultra violet rays. Tilting the slats into a suitable angle also prevents viewing into the room through a

window. For these and other reasons, there is usually provided a tilting mechanism for tilting the slats about a horizontal axis extending through the slats.

A typical tilting mechanism comprises a worm gear assembly fitted
5 within the top rail and manipulable by a rod extending downwards. However, such tilting mechanisms enables only tilting all the slats of the blind in either one or an other direction. Drawback of this arrangement resides in that it is not possible to tilt some of the blinds in one direction, while other slats are tilted in an other direction so as to allow, on the one hand, sufficient light
10 enter the room, and on the other hand to block direct sun light and to prevent viewing the room from the outside.

Several arrangements have been suggested for tilting a first group of the slats in one direction, while tilting the remaining slats in an other direction, typically in a complimentary angle with respect to the first group of
15 salts.

European Patent Application published as 620355 A1 discloses a tilting assembly comprising an additional operating chord passing over pulleys fitted within the head rail and attached to a desired division of slats, whereby the extent of pulling the additional chord dictates the tilting angle of
20 the division of slats independently from the remaining slats.

The arrangement of the above disclosed Patent Application involves several drawbacks. One problem is that the plurality of chords are likely to tangle with one another. Another drawback is that special arresting are required for fixing the length of the additional chord in order to set the desired
25 tilt angle.

U.S. Patent serial No. 5,402,840 discloses a venetian blind in which the slats are divided into upper and lower portions by a divider comprising a spacer and a retainer, which serve to shorten the working length of the tilt adjusting ladders on either the inside or outside of the blind, altering the tilt of
30 the slats of the lower portion so as to be more closed or more open with

respect to the slats of the upper portion, depending on the adjustment of the tilt control adder.

A disadvantage of the device according to that Patent is that a dividing element must be articulated to at least two ladders of the blind and it may frequently happen that the dividing elements are articulated at different heights or unevenly tensioned, thus entailing tilting the blinds not parallel to one another. Displacing each of the at least two divider elements while taking care of correct alignment, is a procedure which might be complex for children or elderly people, and even more so, is impossible for handicaps. It will further be appreciated that displacing the dividing elements is somewhat a hassle.

U.S. Patent serial No. 5,119,868. discloses a venetian blind in which the slats of an upper section and the slats of the lower section are separately adjusted using a three-position switch attached to a rotatable and horizontally movable rod. Depending on the position of the switch, rotation of the control rod adjusts the tilt of the slats of either the upper or the lower slat section.

It is an object of the present invention to provide a novel and improved venetian blind in which the above disadvantages are essentially reduced or overcome. It is a further object of the invention to provide an improved tilting device for a venetian blind.

SUMMARY OF THE INVENTION

According to the present invention there is provided venetian blind comprising a top rail and a bottom rail, a first group of slats supported by at least two first ladders extending between the top and bottom rails, and a second group of slats supported by at least two second ladders extending between a top rail and a bottom rail; and a tilt assembly comprising a tilting rod received within the top rail and operable by a manipulating rod or cord, a reversing mechanism associated with each of the at least one first and second ladders, each reversing mechanism being articulated to the tilting rod and fitted with a first plate and a second plate; each one of said at least two first

ladders is connected to a corresponding first plate and each one of said at least two second ladders is connected to a corresponding second plate; whereby rotation of the tilting rod entails rotation of the first plate and the second plate in the same direction, and whereby further rotation of the tilting rod in the same direction entails rotation of the second plate in an opposite direction.

Inverting the direction of rotation of the second plate occurs in response to over rotation of the tilting rod, whereby the slats of the second group of slats (i.e, the lower group of slats) reach a position in which they can not be further tilted.

10 According to a preferred embodiment of the invention said reversing mechanism is a planetary gear train comprising a an externally geared tube fixed to or integral with the tilting rod, a drive plate rotatably supporting several satellite sprockets and rotatably fixed to the first plate; said tube being engaged with the satellite sprockets which are in-turn engaged with an
15 internal gearing of the second plate

Preferably, the tilting rod has a polygonal cross section and the tube has an axial bore with a corresponding cross-section. However, the tube may be rotatably fixed to the tilting rod by other means, as known *per se*.

According to still a preferred embodiment, the drive plate is spring
20 biased in a direction entailing axial engagement of the first and second plates. Accordingly, the first plate and the second plate are axially biased into rotational engagement with one another.

Preferably, the mating faces of the first and second plates are formed with radial notches which maintain the first plate and the second plate in their
25 rotationally engaged position. However, upon over rotation of the tilting rod the first plate and the second plate disengage from one another, overcoming the biasing force of the biasing spring. The arrangement is such that in a first mode of operation, during rotation of the tilting rod, the first plate and the second plate are rotatably engaged and thus rotate in the same direction. In a
30 second mode of operation, upon further rotation of the tube in the same

direction, the second plate disengages from the first plate and rotates in an opposite direction.

Typically, the second plate and the biasing spring bare against respective retainers which prevent their axial displacement along the tilting
5 rod.

According to a specific embodiment, the ladders are connected to their respective plates by eyelets. Alternatively, the ladders are connected to pins radially projecting from the plates.

The venetian blinds of the type concerned are typically provided also
10 with a height adjusting assembly usually comprising at least two cords attached to the bottom rail, and retaining means adapted for fixing the slack of the cord, thus adjusting the height of the blind, as known *per se*.

The present invention further provides a reversing mechanism of the type specified above, for use in conjunction with a venetian blind as
15 described.

BRIEF DESCRIPTION OF THE DRAWINGS:

In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of a non-limiting example only, with reference to the accompanying drawings, in
20 which:

Fig. 1 is a partially sectioned perspective view of a venetian blind according to the present invention;

Fig. 2 is an exploded perspective view of the reversing mechanism used with a venetian blind according to the invention;

Fig. 3 is a perspective view of the blind with some components hidden, the blind in a first position in which all the slats of the blind are uniformly tilted;

Fig. 4 is a perspective view of the blind with some components hidden, the blind shown in another position in which the first group of slats is
30 tilted at a different angle than that of the second group of slats;

Fig. 5 is a perspective view only of the reversing mechanism in a position in which the first plate and the second plate are rotatably engaged with one another; and

Fig. 6 is a perspective view only of the reversing mechanism in a position in which the first plate and the second plate are rotatably disengaged from one another.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Attention is first directed to Figure 1 of the drawings showing a venetian blind generally designated 10 and comprising a top rail 12 adapted for attachment to a ceiling or wall as known *per se* and a bottom rail 14 suspended from the top rail 12 by two (or more, depending on the size of the blind) elevating cords 16 extending through the top rail 12 and via a retaining mechanism 18 of a known type, with the cords' slack downwardly extending and terminating at a pulling knob 20.

A first group of slats 22 at the upper portion of the blind, comprises a plurality of slats 24, supported by two first ladders 26 and 27, each supporting the slats 24 at their edges (e.g., by the slats resting over the ladders' transverse members or by having edges of the slats attached to vertical members of the ladders). A second group of slats 28, at the lower portion of the blind, comprises a plurality of slats 30, supported by two second ladders 32 and 34 supporting the slats 28 in a manner as explained above.

A tilt assembly generally referred to as 40 comprises a tilting rod 42 having a square cross section, is received within the top rail 12 and is manipulable by a manipulating rod 44 articulated thereto via a worm-gear transmission at 46, the arrangement being such that rotation of manipulating rod 44 entails corresponding rotation of tilting rod 42. It will be noted that

rather than a manipulating rod there may be provided a manipulating cord as known *per se*.

The tilt assembly 40 further comprises a first reversing mechanism 50 associated with ladders 26 and 32, and a second reversing mechanism 52 associated with ladders 27 and 34.

Further attention is now directed to Figure 2, as well as to Figs. 5 and 6, illustrating the construction of the reversing mechanisms 50 and 52. A tube member 54 has an axial bore 56 with a cross section corresponding with that of tilting rod 42 and is formed with an externally geared rim 58. A drive plate 60 is rotatably mounted over tube and is fitted with three axially extending shafts 62, each rotatably holding a satellite sprocket 64, whereby the three satellite sprockets are engaged with the geared rim 58 of tube member 54.

A first plate 68 is rotatably mounted over the tube member 54, said first plate has on its periphery a radially projecting stud 70 and a plurality of radial notches 72, on a face thereof facing the drive plate 60. The first plate 68 comprises three bores 74 for fit receiving of the shafts 62 axially projecting from the drive plate 60. A second plate 76 is formed with an internal gearing 78 adapted for engagement with the gearing of the satellite sprockets 64. A face of the second plate facing the first plate comprises a plurality of radial notches 80 adapted for engagement with notches 72 of the first plate, as will hereinafter be explained. The second 76 comprises on its periphery a radially projecting stud 82.

After mounting the first plate 68 over the tube member 54, a retaining ring 88 is secured to the tube member by means of screw 90. A coiled spring 92 is mounted between the drive plate 60 and a second retaining ring 94 secured by screw 95, thus biasing the drive plate towards the second plate 76, and the later into engagement with the first plate 68, thus compacting the reverse mechanism, as seen in Fig. 4.

As seen in Fig. 1 (and also partly in Figs. 3 and 4), ladder 32 is attached to stud 70 of the first plate 68 of reversing mechanism 50 and ladder 26 is attached to stud 82 of the second plate 76 of the same reversing mechanism. Similarly, ladder 34 is attached to stud 70 of the first plate 68 of reversing mechanism 52 and ladder 27 is attached to stud 82 of the second plate 76 of the same reversing mechanism. It will thus be appreciated that rotation of the first and second plates will cause winding or dispensing of the ladder cords respective to the direction of rotation of the plates.

10 The arrangement is such that in a first mode of operation, as illustrated in Figs. 3 and 5, the first plate 68 and the second plate 76 are rotatably engaged with one another at their mating notched faces, whereby rotating the tilting rod 42, e.g, in direction of arrow 100 in Fig. 5, entails rotation of the first and second plates in the same direction, as illustrated by
15 arrows by arrows 102 and 104, correspondingly. In this mode of operation, the slats 24 of the first group of slats 22 and the slats 30 of the second group of slats 28, are uniformly rotated, depending on the direction of rotating the manipulating rod 44.

In a second mode of operation, illustrated in Figs. 4 and 6, when the
20 tilting rod 42 is over-rotated in the same direction (i.e, in direction of arrow 106 in Fig. 6), the slats 30 of the second slat group 28 reach a position in which they can not be further tilted. In this position the satellite sprockets 64 are forced to rotate in the opposite direction entailing the second plate 76 to reverse its direction of rotation whereby the second plate 76 disengages
25 from the first plate 68, overcoming the biasing effect of the coiled spring 92, allowing the plates to independently rotate in opposed directions, whereby the second plate 76 now rotates in direction of arrow 108. In this position the second group of slats 28 now rotates in a reversed direction, whereby the first and second slat groups acquire opposite tilting angles as
30 seen in Figs. 1 and 4.

However, upon ceasing the rotation of the tilting rod 42, the first and second plates re-engage into the position seen in Figs. 3 and 5 so the slats of the first and second groups maintain their different tilted angles.

It should be understood that it is preferred to provide a reversing
5 mechanism for each couple of first and second ladders in order to ensure smooth and equal tilting of the slats. However, for essentially small blinds a single reversing mechanism may be used, although a minimum of two reversing mechanisms is preferable.

CLAIMS:

1. A venetian blind comprising a top rail and a bottom rail, a first group of slats supported by at least two first ladders extending between
5 the top and bottom rails, and a second group of slats supported by at least two second ladders extending between the top rail and the bottom rail; and a tilt assembly comprising a tilting rod received within the top rail and operable by a manipulating rod or cord, a reversing mechanism associated with each of the at least one first and second ladders, each reversing mechanism being
10 articulated to the tilting rod and fitted with a first plate and a second plate; each one of said at least two first ladders is connected to a corresponding first plate and each one of said at least two second ladders is connected to a corresponding second plate; whereby rotation of the tilting rod entails rotation of the first plate and the second plate in the same direction, and whereby
15 further rotation of the tilting rod in the same direction entails rotation of the second plate in an opposite direction.
2. A venetian blind according to claim 1, wherein said reversing mechanism is a planetary gear train comprising an externally geared tube fixed to or integral with the tilting rod, a drive plate rotatably supporting
20 several satellite sprockets and rotatably fixed to the first plate; said tube being engaged with the satellite sprockets which are in-turn engaged with an internal gearing of the second plate
3. A venetian blind according to claim 2, wherein the drive plate is spring biased in a direction entailing axial engagement of the first and
25 second plates.
4. A venetian blind according to claim 3, wherein said first plate and said second plate are axially biased into rotational engagement with one another.
5. A venetian blind according to claim 4, wherein mating faces of
30 the first and second plates are formed with radial notches.

6. A venetian blind according to claim 1, wherein the ladders are connected to their respective plates by eyelets.

7. A venetian blind according to claim 2, wherein the tilting rod has a polygonal cross section and the tube has an axial bore with a corresponding cross-section.
5

8. A tilting mechanism for selectively controlling the tilt angle of two separate groups of slats of a venetian blind in which slats of a first section and slats of a second section are each carried by first and second ladders respectively and are separately adjustable, the tilting mechanism including an externally geared tube member, adapted to be driven by a tilting rod of a venetian blind, a first plate rotatably mounted on said tube member, a second plate rotatably mounted on said tube member and having an internal gearing, said first and second plates having opposite mating surfaces and are each provided with engaging means adapted to engage a relevant one of the first and second ladders of a venetian blind, characterized by a drive plate rotatably mounted on said tube member facing said second plate axially opposite to said first plate and rotatably supporting at least one satellite sprocket, wherein said drive plate is connected to said first plate for rotation therewith, wherein said externally geared tube member engages said at least one satellite sprocket and said at least one satellite sprocket, in-turn, engages the internal gearing of the second plate and wherein a spring biases said drive plate in axial direction, so as to entail the opposite mating surfaces of said first and second plates into rotational engagement with one another; wherein the engaging means comprise a radially projecting stud on said first plate and a radially projecting stud on said second plate.
10
15
20

9. A tilting mechanism according to claim 8, wherein the mating faces of the first and second plates are each formed with a plurality of radial notches.
25

1/5

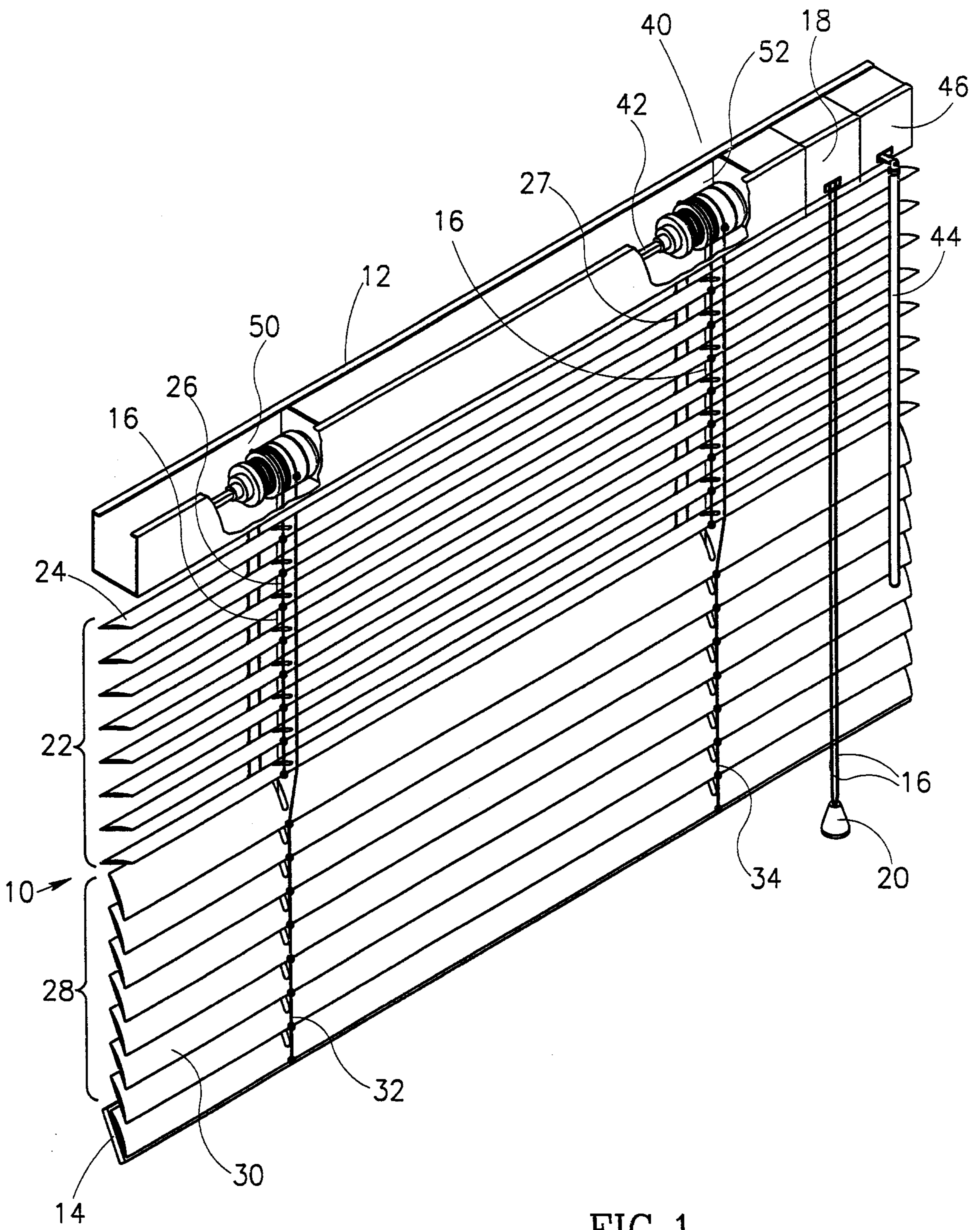


FIG. 1

Inventor: PASTOR, Vincente M.S.

Swabeey Ogilvy Renault
Patent Agents

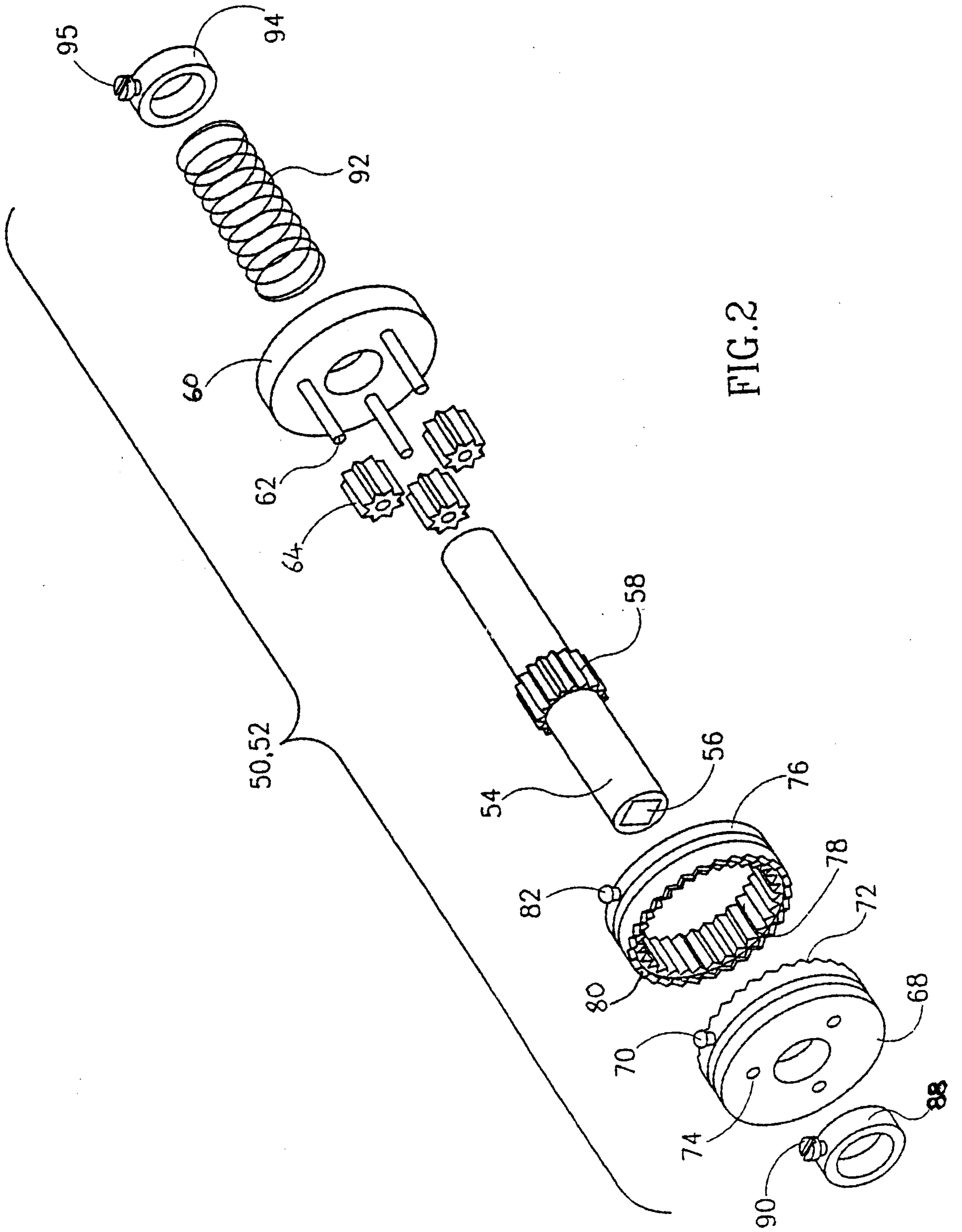


FIG. 2

3/5

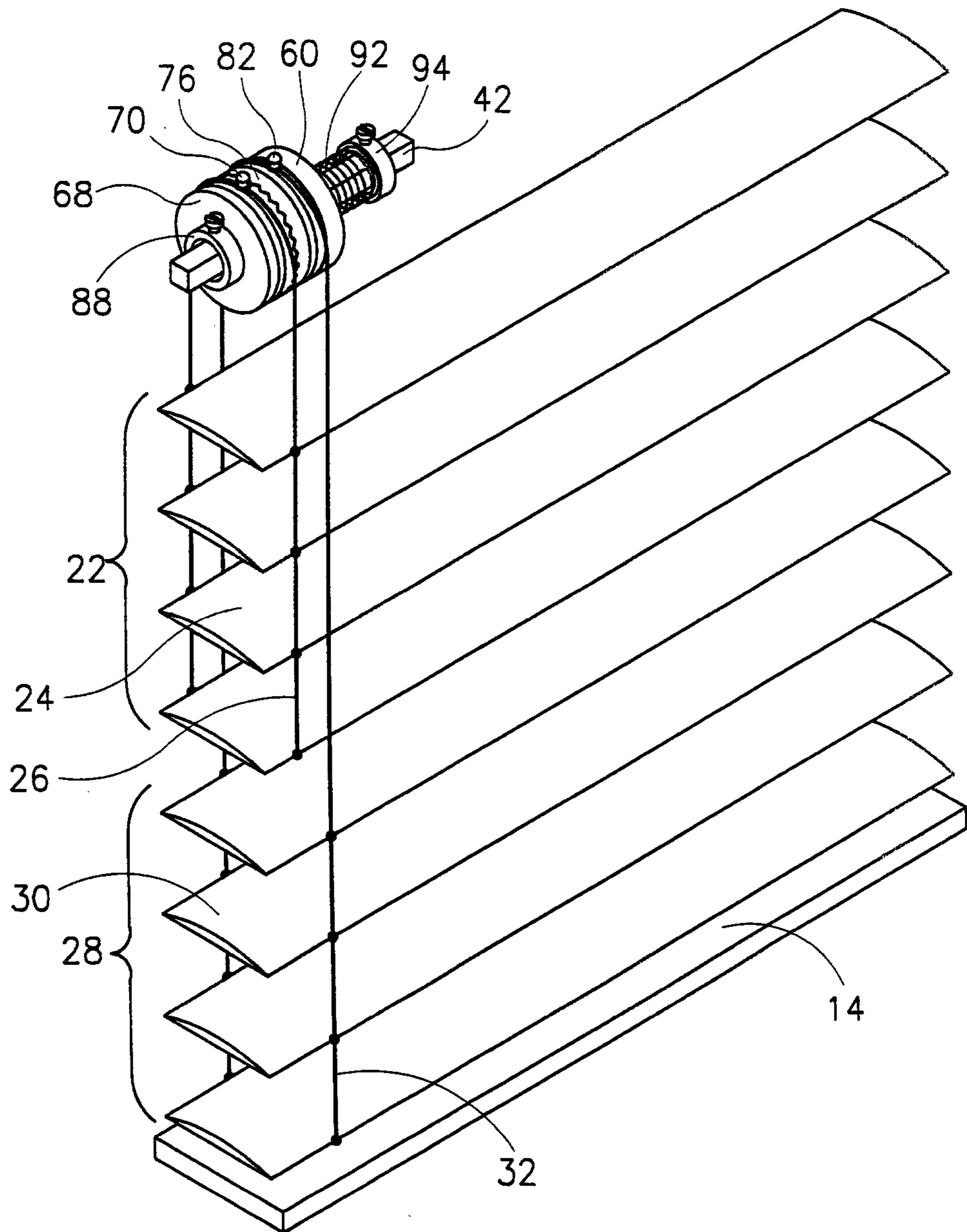


FIG.3

Inventor: PASTOR, Vincente M.S.

Swabeey Ogilvy Renault
Patent Agents

4/5

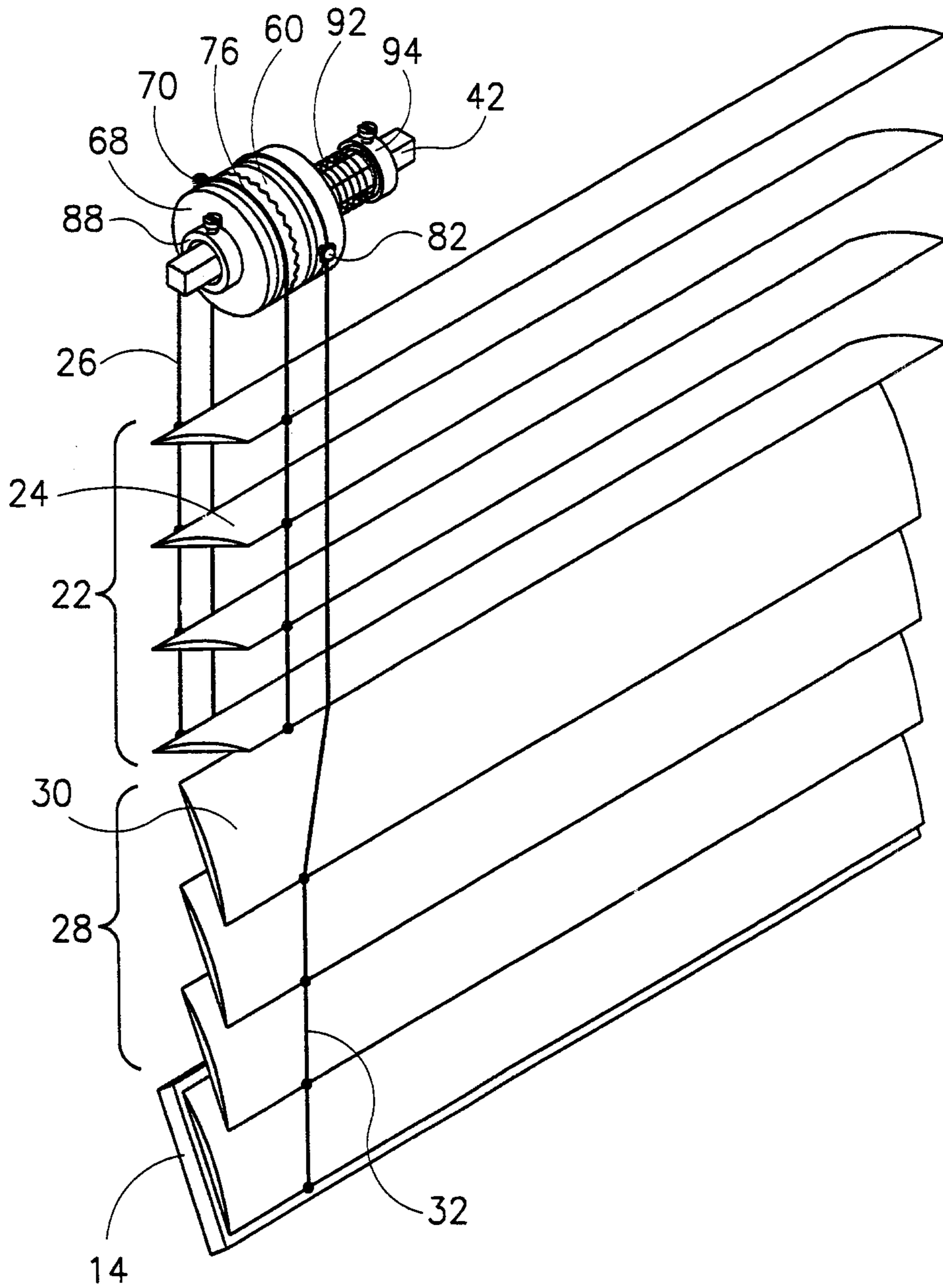


FIG.4

Inventor: PASTOR, Vincente M.S.

Swabeey Ogilvy Renaud
Patent Agents

5/5

