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(54) **SLAT ANGLE ADJUSTING DEVICE FOR A VENETIAN BLIND**

(76) Inventor: **Tai-ping Liu**, No. 15, Alley 8, Lane 3, Kuochi St., Lungching Hsien, Taichung Hsien (TW)

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Related U.S. Patent Documents

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(52) **U.S. Cl.** ..... **160/177 R**

(58) **Field of Search** ..... 160/166.1 R, 168.1 R, 160/170 R, 171 R, 172 R, 173 R, 176.1 R, 177 R, 178.1 R, 115, 107

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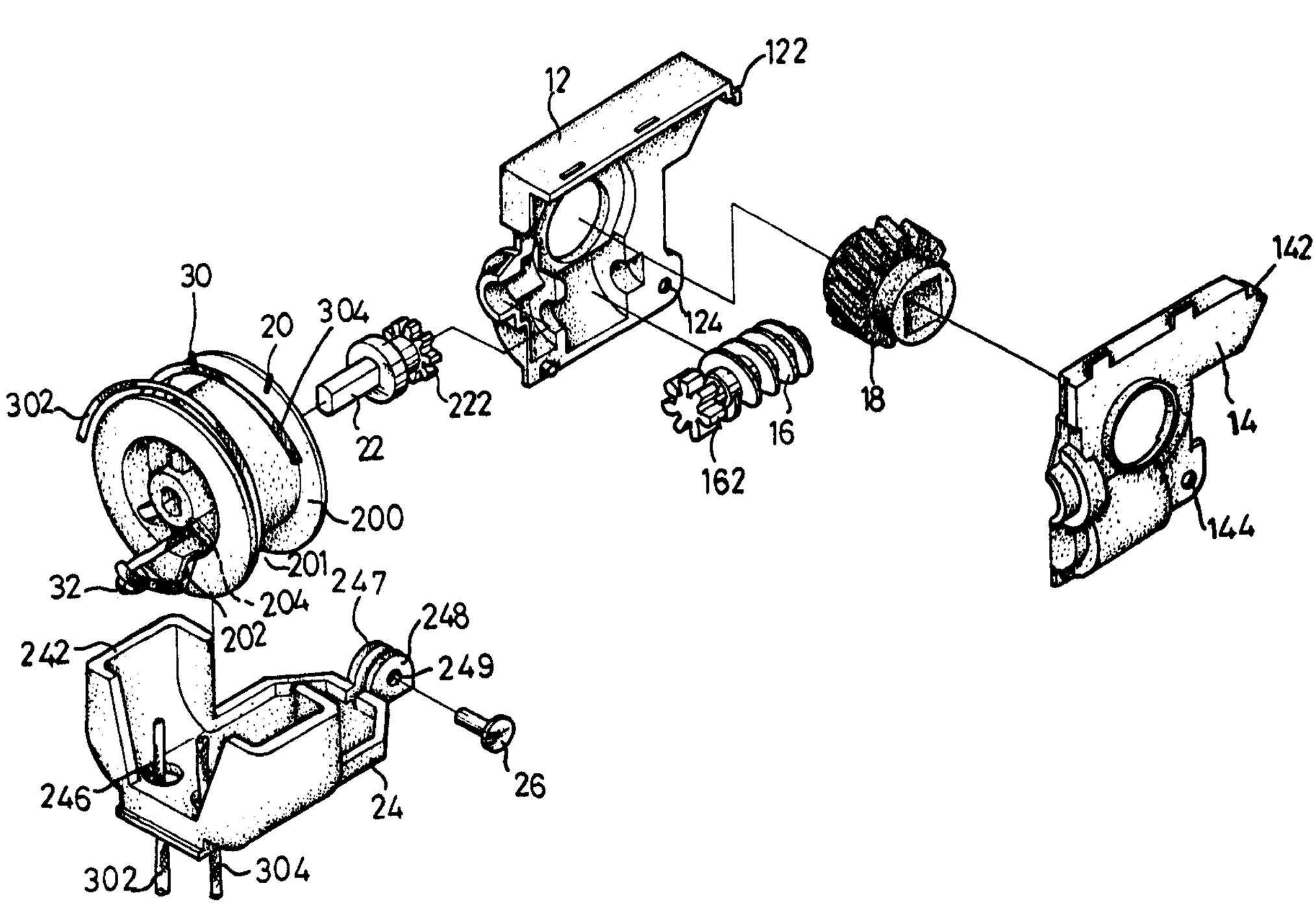
Primary Examiner—David M. Purol

(74) *Attorney, Agent, or Firm*—Michaelson & Wallace; Peter L. Michaelson

(57) **ABSTRACT**

A slat angle adjusting device for a Venetian blind includes a first casing and a second casing coupled with each other. A pinion is rotatably mounted between the first and second casings. A worm is rotatably mounted between the first and second casings and meshes with the pinion. A driven gear is fixedly mounted on one end of the worm. A drive gear is rotatably mounted between the first and second casings and meshes with the driven gear. A drive axle is formed on one end of the drive gear and extends outward of the first and second casings. A bracket includes a fist end portion engaged with the first and second casings, and a second end portion having two side walls extending upwardly therefrom. A roller is fixedly mounted on the drive axle and is rotatably received between the two side walls of the bracket.

5 Claims, 5 Drawing Sheets



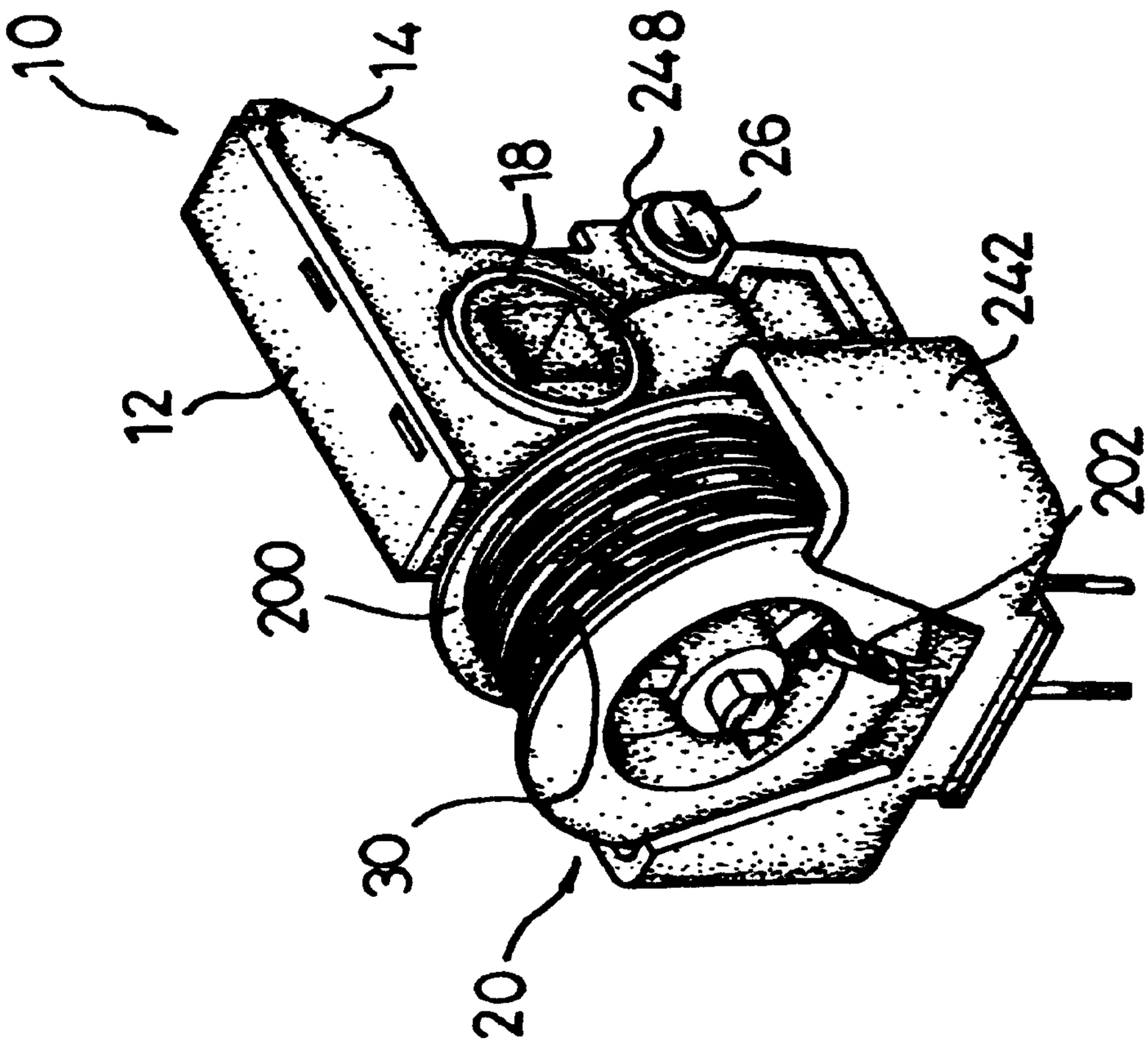
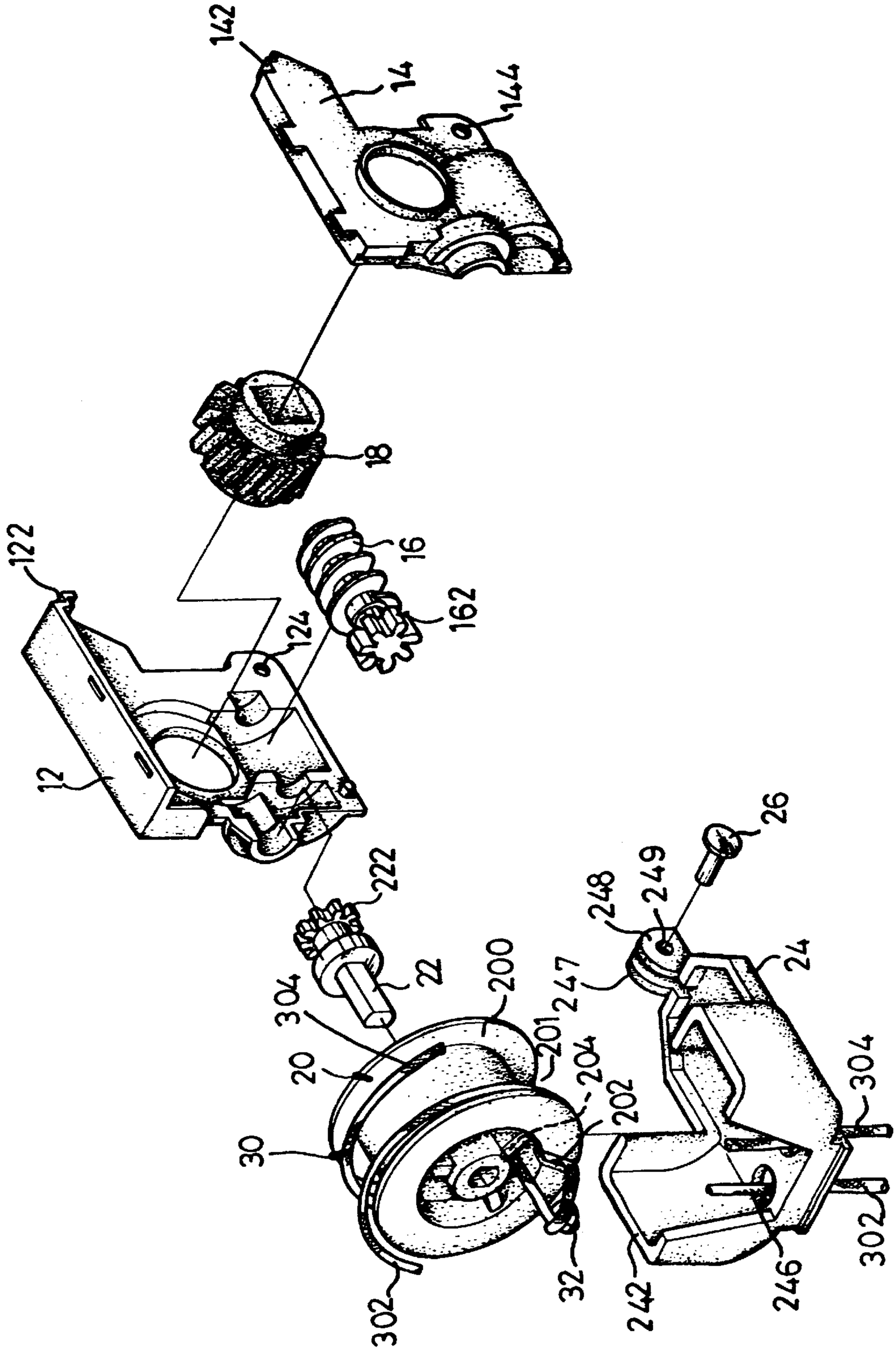


FIG. 1


142
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24
204
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FIG. 2

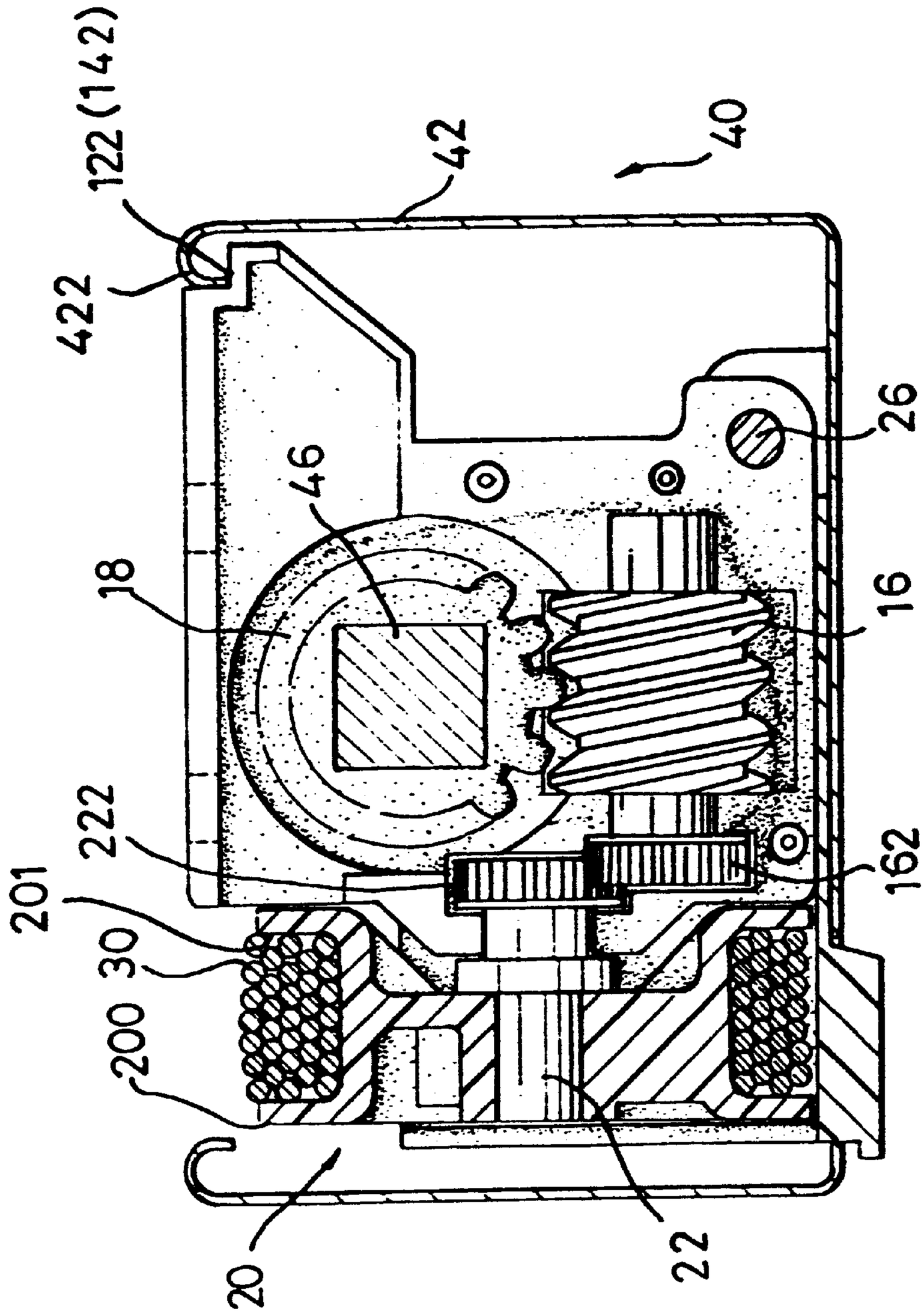

FIG. 3

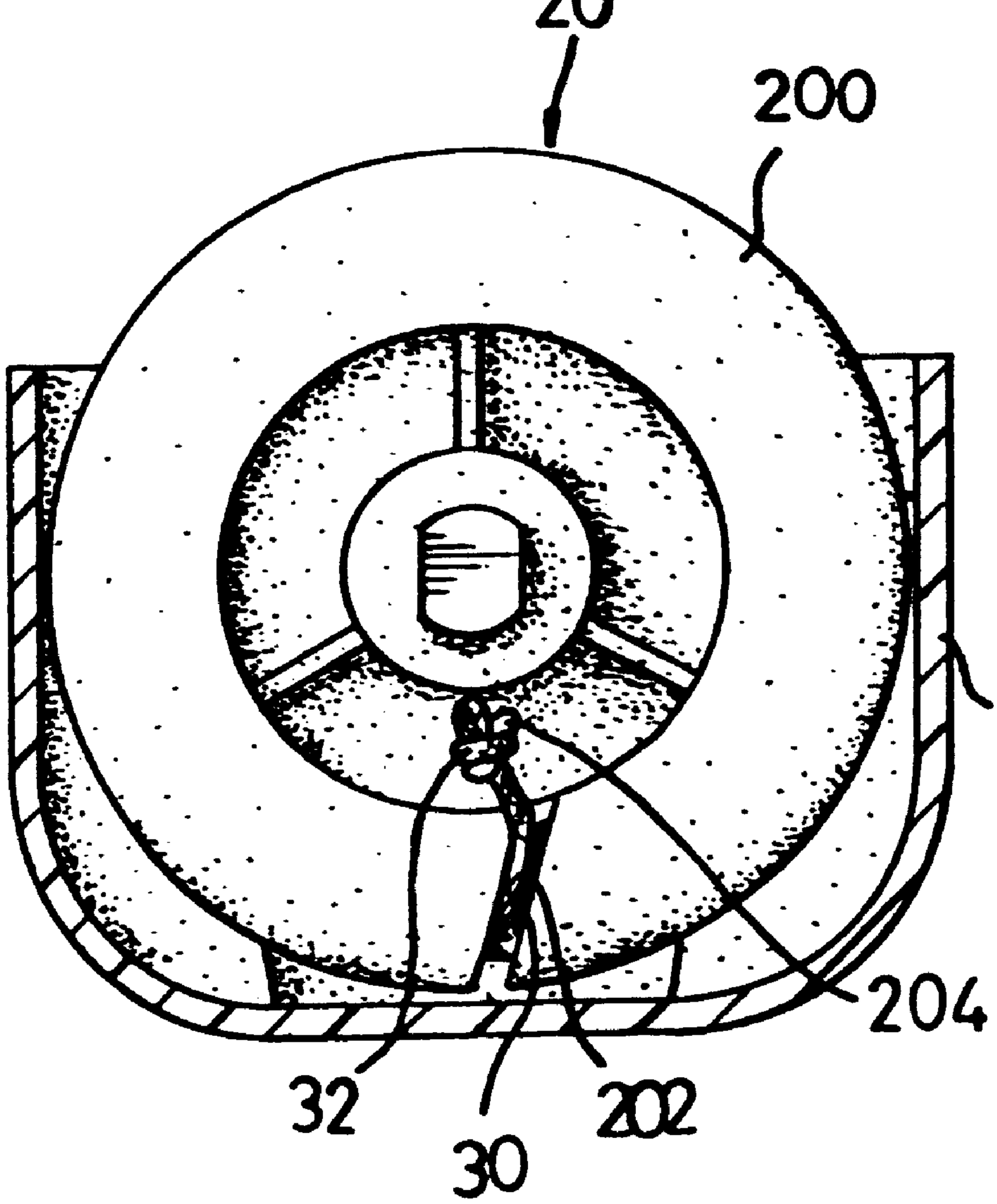

FIG. 4

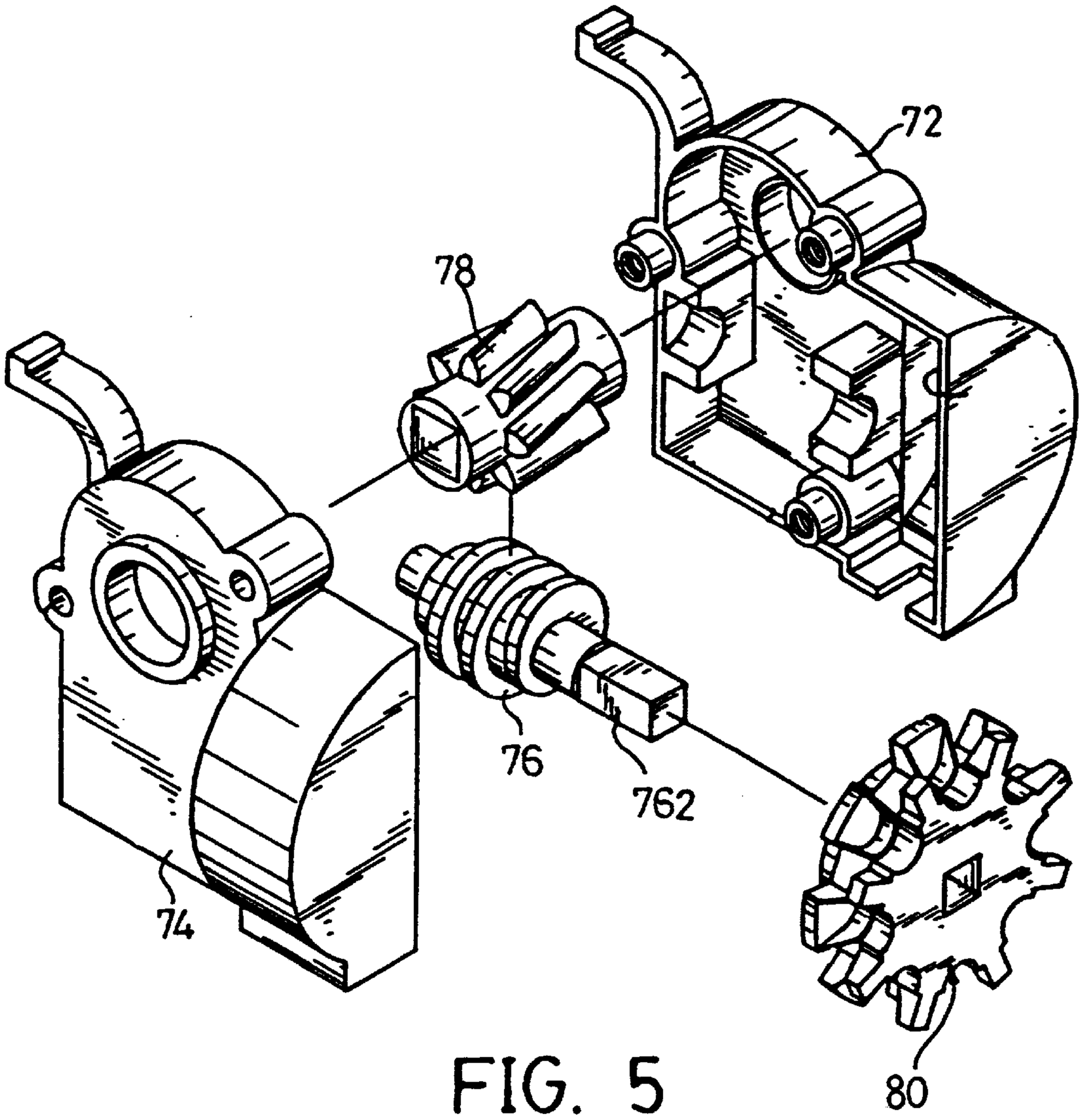

FIG. 5
PRIOR ART

SLAT ANGLE ADJUSTING DEVICE FOR A VENETIAN BLIND

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

FIELD OF THE INVENTION

The present invention relates to an angle adjusting device, and more particularly to a slat angle adjusting device for a Venetian blind.

BACKGROUND OF THE INVENTION

A conventional slat angle adjusting device for a Venetian blind is shown in FIG. **5**, however, there still remain shortcomings therein. There will be a complete illustration in the detailed description of the preferred embodiments, concerning the conventional adjusting device.

The present invention has arisen to mitigate and/or obviate the disadvantage of the conventional device.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, there is provided a slat angle adjusting device for a Venetian blind and comprising a first casing and a second casing coupled with each other.

A pinion is rotatably mounted between the first and second casings. A worm is rotatably mounted between the first and second casings and meshes with the pinion. A driven gear is fixedly mounted on one end of the worm. A drive gear is rotatably mounted between the first and second casings and meshes with the driven gear. A drive axle is formed on one end of the drive gear and extends outward of the first and second casings.

A bracket includes a first end portion engaged with the first and second casings, and a second end portion having two side walls extending upwardly therefrom. A roller is fixedly mounted on the drive axle and is rotatably received between the two side walls of the bracket.

Further features of the present invention will become apparent from a careful reading of the detailed description provided hereinbelow, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a slat angle adjusting device for a Venetian blind in accordance with the present invention;

FIG. **2** is an exploded view of FIG. **1**;

FIG. **3** is a front plan cross-sectional view of FIG. **1**, showing the adjusting device being received in a headrail of the Venetian blind;

FIG. **4** is a partially cross-sectional side view of FIG. **1**; and

FIG. **5** is an exploded view of a conventional slat angle adjusting device for a Venetian blind in accordance with the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For a better understanding of the present invention, reference is made to FIG. **5** illustrating a conventional slat angle adjusting device for a Venetian blind (not shown) in accordance with the prior art.

The conventional slat angle adjusting device comprises a first casing **72** and a second casing **74** coupled together with each other and received in a substantially U-shaped headrail (not shown) of the Venetian blind.

A tilt rod (not shown) is longitudinally disposed in the headrail and extends through the first and second casings **72** and **74**. A pinion **78** is rotatably received between the first and second casings **72** and **74** and is fixedly mounted around the tilt rod.

A worm **76** located beneath the pinion **78** is rotatably mounted between the first and second casings **72** and **74** and meshes with the pinion **78**. A drive shaft **762** square in cross-section is formed on one end portion of the worm **76**. A pulley **80** is rotatably received between the first and second casings **72** and **74** and is fixedly mounted around the drive shaft **762**. A tilt cord (not shown) winds around the pulley **80** and has two distal ends extending downwardly.

In operation, a user can exert a drawing force on the two distal ends of the tilt cord, thereby rotating the pulley **80** which can drive the drive shaft **762** to rotate the worm **76** which can in turn rotate the pinion **78** so as to rotate the tilt rod, thereby adjusting a rotational angle of a plurality of slats (not shown) of the Venetian blind.

By such an arrangement, the worm **76** together with the drive shaft **762** is driven by means of the drawing force of the tilt cord so as to rotate the tilt rod via the pinion **78**, thereby rotating the plurality of slats.

However, the user has to exert a large force on the tilt cord so as to rotate the plurality of slats via a transmission of the worm **76** and the pinion **78** when the plurality of slats are made of a heavy material such as wood and the like, thereby greatly causing an inconvenience in operation.

Referring to the remaining drawings, and initially to FIGS. **1–3**, a slat angle adjusting device **10** in accordance with the present invention is provided for adjusting a rotational angle of a plurality of slats (not shown) of a Venetian blind **40**. The Venetian blind **40** comprises a headrail **42** substantially U-shaped in section with two side walls each having a hook portion **422** extending inwardly and downwardly therefrom.

The slat angle adjusting device **10** comprises a first casing **12** and a second casing **14** received in the headrail **42** and coupled with each other. The first and second casings **12** and **14** respectively have an abutting edge **122** and **142** on each of which an associated hook portion **422** of the headrail **42** is securely rested respectively.

A pinion **18** is rotatably mounted between the first and second casings **12** and **14**. A tilt rod **46** is fixedly mounted in and driven by the pinion **18** for adjusting a rotational angle of the plurality of slats of the Venetian blind **40**.

A worm **16** located beneath the pinion **18** is rotatably mounted between the first and second casings **12** and **14** and meshes with the pinion **18**, and a driven gear **162** is fixedly mounted on one end of the worm **16**.

A drive gear **222** located above the driven gear **162** is rotatably mounted between the first and second casings **12** and **14** and meshes with the driven gear **162**. A drive axle **22** with a square cross-section is integrally formed on one end of the drive gear **222** and extends outward of the first and second casings **12** and **14**.

A supporting bracket **24** is received in the headrail **42** and has a first end portion mounted on an underside of the first and second casings **12** and **14**, and a second end portion

having two side walls **242** extending upwardly therefrom. Two spaced holes **246** are vertically defined in the second end portion thereof and are located between the two side walls **242**.

A first ear **247** and a second ear **248** are formed on the first end portion of the supporting bracket **24** and are each mounted on an outer wall of the first and second casings **12** and **14** respectively.

A pin **26** extends sequentially through a second hole **249** defined in the second ear **248**, a second bore **144** defined in the second casing **14**, a first bore **124** defined in the first casing **12** and a first hole (not numbered nor shown) defined in the first ear **247**. A small distal tip of the pin **26** is deformed to prevent its loss. The supporting bracket **24** is thereby attached to the combined first and second casings **12** and **14**.

A roller **20** is fixedly mounted to the drive axle **22** and is rotatably received between the two side walls **242** of the supporting bracket **24**.

Referring to FIGS. **2** and **4**, the roller **20** includes two sides each having a flange **200** extending radially and outwardly therefrom. A recess **201** is defined between the two flanges **200**. Each of the two flanges **200** has a slit **202** defined therein and communicating with the recess **201**. A through hole **204** is longitudinally defined in the roller **20**.

A tilt cord **30** extends through the through hole **204** and has a first end **302** extending through one slit **202**, it then winds around the roller **20** and extends downwardly through one hole **246** of the supporting bracket **24**, and has a second end **304** extending through the other slit **202**, it then winds around the roller **20** along a direction opposite to that of the first end **302** and extends downwardly through the other hole **246** of the supporting bracket **24**.

Preferably, a knot **32** is formed at a meditate portion of the tilt cord **30** and is stopped by a side wall defining the through hole **204** of the roller **20**.

In operation, referring to FIGS. **2** and **3**, a user can exert a pulling force on the first end **302** (or the second end **304**) of the tilt cord **30**, thereby rotating the roller **20** which can force the drive axle **22** to rotate the drive gear **222** which in turn rotates the driven gear **162** together with the worm **16** which is able to rotate the pinion **18** so as to rotate the tilt rod **46**, thereby easily adjusting a rotational angle of the plurality of slats of the Venetian blind **40**.

By such an arrangement, the tilt cord **30** can be used to rotate the plurality of slats of the Venetian blind **40** by means of the drive gear **222** co-operating with the driven gear **162** and the worm **16** co-operating with the pinion **18** without having to exert a large pulling force on the tilt cord **30** even when the plurality of slats are made of heavy material such as wood and the like, thereby greatly facilitating operation of the tilt cord **30**.

It should be clear to those skilled in the art that further embodiments of the present invention may be made without departing from the scope and spirit of the present invention.

What is claimed is:

1. A slat angle adjusting device **(10)** for a Venetian blind **(40)** comprising:

a first casing **(12)**;

a second casing **(14)** coupled with said first casing **(12)**;

a pinion **(18)** rotatably mounted between said first and second casings **[(12)** and **(14)]**;

a worm **(16)** rotatably mounted between said first and second casings **[(12)** and **(14)]** and meshing with said pinion **(18)**, a driven gear **(162)** fixedly mounted on one end of said worm **(16)**;

a drive gear **(222)** rotatably mounted between said first and second casings **[(12)** and **(14)]** and meshing with said driven gear **(162)**, a drive axle **(22)** formed on one end of said drive gear **(222)** and extending outward of said first and second casings **[(12)** and **(14)]**;

a bracket **(24)** having a first end portion engaged with said first and second casings **[(12)** and **(14)]**, and a second end portion **[**having two side walls **(242)** extending upwardly therefrom**]**; and

a roller **(20)** fixedly mounted around said drive axle **(22)** and rotatably received **[**between said two side walls **(242)** of**]** *by* said bracket **(24)**.

2. The slat angle adjusting device in accordance with claim **1**, wherein said roller **(20)** has two sides each having a flange **(200)** extending radially and outwardly therefrom, a recess **(201)** defined in said roller **(20)** and located between said two flanges **(200)**, each of said two flanges **(200)** having a slit **(202)** defined therein and communicating with said recess **(201)**.

3. The slat angle adjusting device in accordance with claim **1**, wherein said roller **(20)** has a through hole **(204)** longitudinally defined therein.

4. The slat angle adjusting device in accordance with claim **1**, wherein said bracket **(24)** has two spaced holes **(246)** vertically defined in the second end portion thereof and located under said roller **(20)**.

5. The slat angle adjusting device in accordance with claim 1, wherein said bracket (24) has two side walls (242) extending upwardly from the second end portion thereof, and said roller (20) is rotatably received between said two side walls (242) of said bracket (24).

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