Oct. 7, 1969 R. D. KINCAID 3,470,587

PLANETARY COILER

Filed Dec. 5, 1967 3 Sheets-Sheet 1

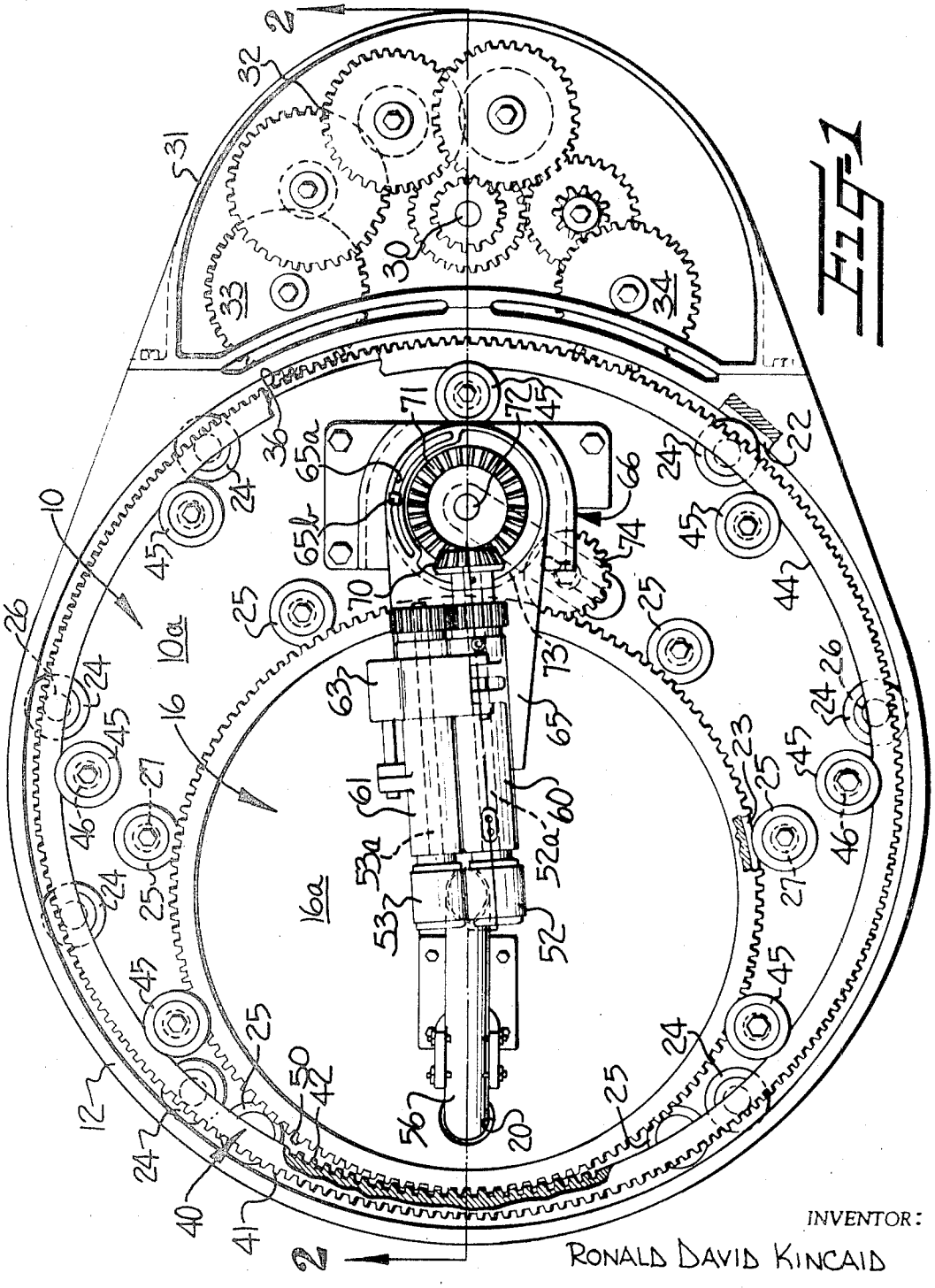


Fig. 1

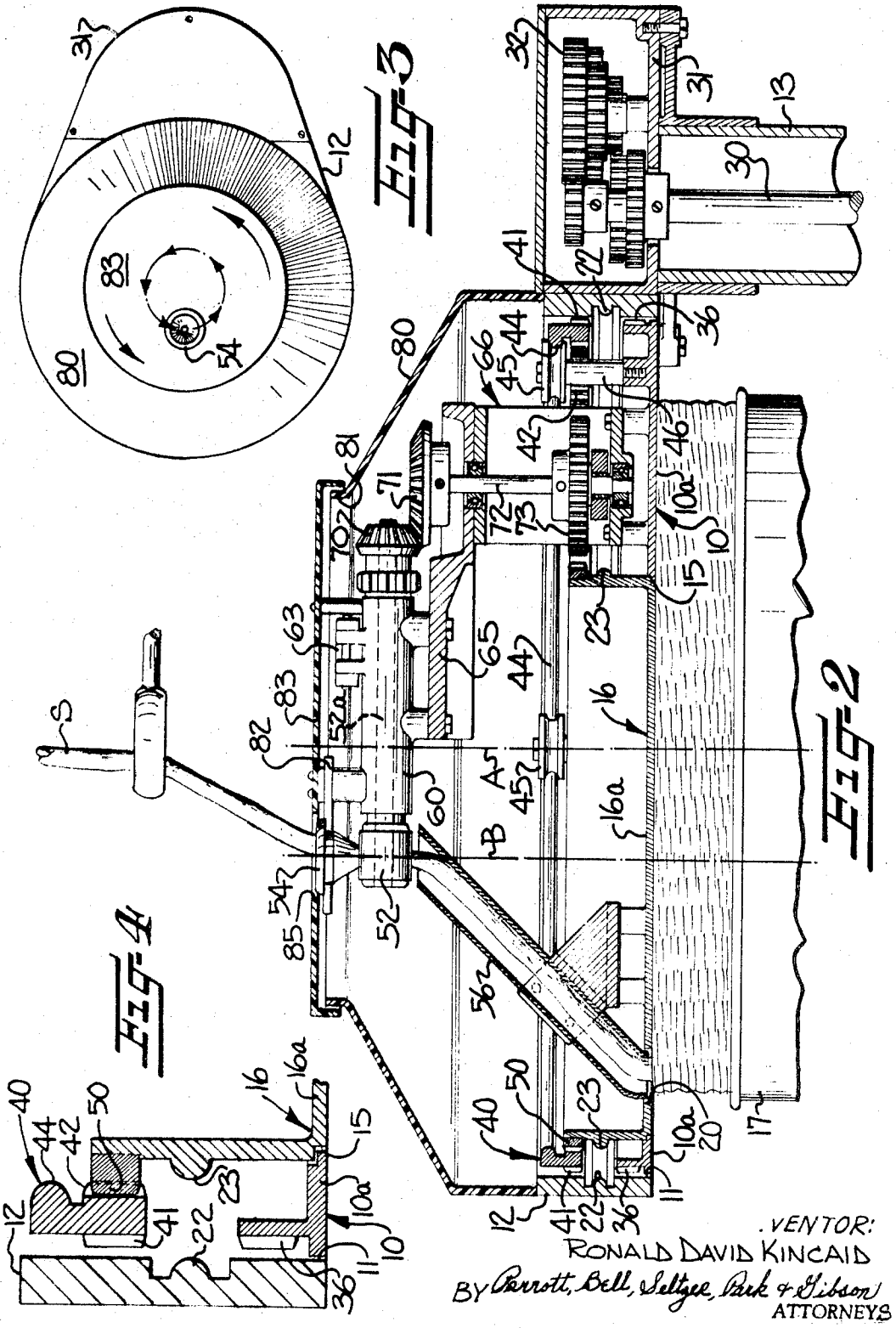
INVENTOR:
RONALD DAVID KINCAID

BY Parrott, Bell, Seltzer, Park & Gibson
ATTORNEYS

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PLANETARY COILER

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PLANETARY COILER

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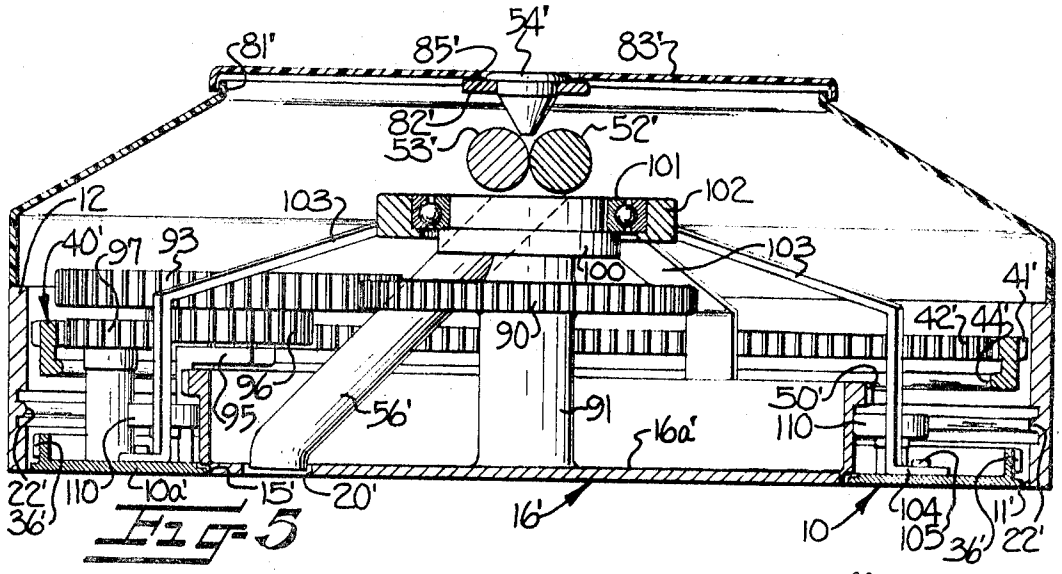


Fig-5

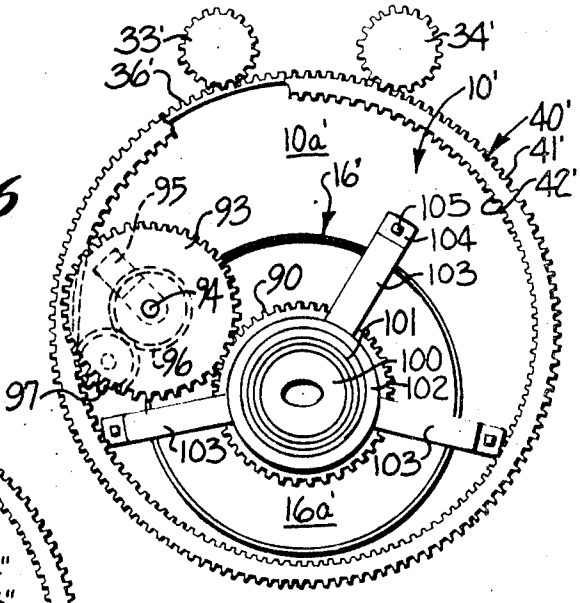


Fig-6

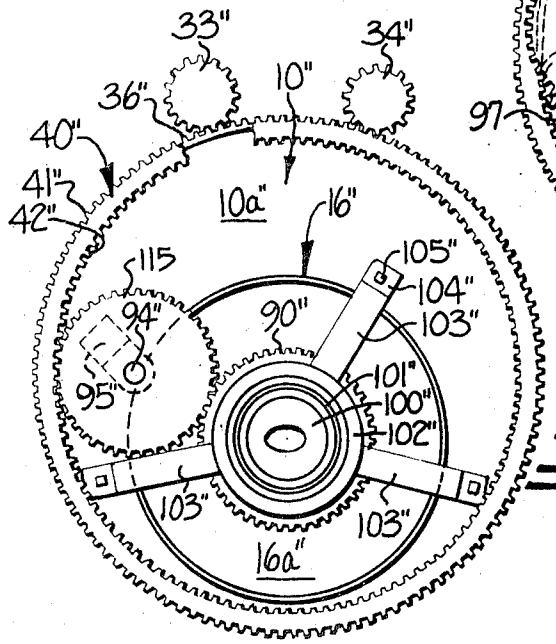


Fig-7

INVENTOR:
RONALD DAVID KINCAID

BY Parrott, Bell, Seltzer, Park & Gibson

ATTORNEYS

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PLANETARY COILER

Ronald David Kincaid, Kings Mountain, N.C., assignor, by mesne assignments, to The Warner & Swasey Company, Cleveland, Ohio, a corporation of Ohio

Filed Dec. 5, 1967, Ser. No. 688,056
Int. Cl. D01h 1/36, 1/40
U.S. Cl. 19—159 2 Claims

ABSTRACT OF THE DISCLOSURE

A planetary coiler wherein the calender rolls are desirably located substantially concentric with a coiler member for presenting only a small orbital path of movement of the calender rolls and thereby facilitating the positioning of the strand material into an associated trumpet which directs the strand material to the calender rolls and thence to the eccentric exit opening through the lower base of the coiler member.

This invention relates to coilers for coiling strand material; especially textile slivers, into cans or other containers, and is particularly concerned with an improved planetary coiler incorporating therein calender rolls substantially centrally disposed above an eccentric coiler member for facilitating the positioning and feeding of sliver thereto, and wherein simplified power transmission means are provided for rotating the eccentric coiler member and associated calender rolls.

Another feature of the invention is to provide a planetary coiler which may be operated at very high speeds facilitated by the fact that the calender rolls are carried by and moved with the spectacle which rotates at a much slower speed than that of the eccentrically positioned coiler member; e.g., the coiler member may rotate on its axis about 40 to 60 times faster than the spectacle depending upon the desired lay of the strand material in the corresponding container.

Generally, the invention is directed to improvements in a planetary coiler of the type disclosed in the assignee's copending application Ser. No. 566,870, filed July 21, 1966, now Patent No. 3,355,775, and entitled Planetary Coiler Head, and comprises a driven rotary spectacle in which a rotary coiler member is eccentrically positioned and wherein a supporting means is fixed on the spectacle for supporting calender rolls so that they overlie the coiler member and are intersected by the rotational axis of the coiler member. Thus, the calender rolls move in an orbital path whose radius corresponds to the distance between the axes of the spectacle and the coiler member so that the calender rolls always are intersected by the rotational axis of the coiler member throughout orbital movement of the coiler member about the axis of the spectacle. A guide means, preferably in the form of an inclined tube, is positioned between the calender rolls and the coiler member for guiding strand material through an exit passage eccentrically located and extending through the coiler member and, additionally, a coiler gear mounted in fixed relation to the coiler member and substantially concentric with the coiler member is drivingly connected to a driven rotary ring gear which is substantially concentric with, but rotates independently of, the spectacle. A gear means operatively connects the coiler gear to the calender rolls for driving the calender rolls.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a top plan view of one embodiment of the planetary coiler of the instant invention with upper portions of its housing means removed for purposes of clarity;

FIGURE 2 is a vertical sectional view taken substantially along line 2—2 in FIGURE 1 and including the upper portions of the housing means;

FIGURE 3 is a top plan view, on a reduced scale, of the planetary coiler;

FIGURE 4 is an enlarged fragmentary sectional view of the lower left-hand portion of the coiler shown in FIGURE 2;

FIGURE 5 is a vertical sectional view showing a second embodiment of the planetary coiler;

FIGURE 6 is a somewhat schematic plan view, on a reduced scale, of a coiler member drive means of the planetary coiler shown in FIGURE 5; and

FIGURE 7 is a schematic plan view showing still another embodiment of the drive means for the coiler member.

FIRST EMBODIMENT OF THE INVENTION

Referring more specifically to the drawings, the planetary coiler of FIGURES 1–4 comprises a driven rotary spectacle **10** having a planar lower surface. Spectacle **10** is supported for rotation about a substantially vertical main axis A in a large circular opening **11** formed in a main housing **12**. Housing **12** may be supported upon a suitable frame shown in the form of a column **13** in FIGURE 2.

The base **10***a* of spectacle **10** is provided with an opening **15** therethrough in which the lower portion of a rotary coiler member **16** is positioned in eccentric relation to spectacle **10**. In other words, coiler member **16** is supported by spectacle **10**, in a manner to be later described, for rotation about substantially vertical auxiliary axis B spaced from main axis A.

Coiler member **16** is also provided with a planar lower surface which is substantially flush with the lower surface of spectacle **10**. As shown, spectacle **10** and coiler member **16** overlie a stationary coiler can **17** or other suitable container for receiving a textile sliver S or other strand material therein. Coiling of the sliver S in the required convolute path within can **17** is obtained by the coil forming rotation of coiler member **16** and the coil precessing rotation of spectacle **10**. The base **16***a* of coiler member **16** has an eccentrically located strand exit passage or opening **20** therethrough for the passage of sliver therethrough.

In FIGURES 1 and 2, spectacle **10** and coiler member **16** are mounted for relative rotation and for rotation relative to main housing **12** by support means of the type disclosed in said copending application Serial No. 566,870. As best shown in FIGURES 2 and 4, the inner peripheral surface of main housing **12** and the outer peripheral surface of the upstanding annular flange of coiler member **16** are provided with respective annular bead projections or trackways **22, 23**, the former of which is concentric with the circular opening **11** in housing **12**, and the latter of which is concentric with auxiliary axis B of coiler member **16**. The trackways **22, 23** are engaged by respective groups of circumferentially spaced, peripherally grooved rollers **24, 25** which are rotatably mounted on respective posts **26, 27** attached to and projecting upwardly from the lower wall or base **10***a* of spectacle **10**. It is thus seen that spectacle **10** is suspended from housing **12** for rotation therein and that spectacle **10** supports coiler member **16** for rotation relative thereto. The configuration of the annular trackways **22, 23** and the respective peripherally grooved rollers **24, 25** is such as to restrain spectacle **10** and coiler member **16** against relative vertical movement and to also restrain spectacle **10** from vertical movement relative to housing **12**.

Drive means for imparting relative rotation to spectacle **10** and coiler member **16** will now be described.

In FIGURES 1 and 2, the numeral **30** designates a suitably driven drive shaft which may be driven by the associated machine such as a carding machine or drawing frame, for example. In this instance, drive shaft **30** extends vertically within column **13** and enters a gear box **31** which may be suitably secured to housing **12**. The gear box **31** contains a train of gears **32** which connect the upper portion of drive shaft **30** to a pair of drive gears **33**, **34** partially disposed within gear box **31** and which extend through suitable slots provided in the wall of the housing **12**. Drive gear **33** engages a circle of gear teeth **36** projecting outwardly from the peripheral upwardly extending flange of spectacle **10**, which circle of gear teeth constitutes a spectacle gear. Thus drive gear **33** imparts relatively slow rotation to spectacle **10** on its main axis A.

In the first embodiment of the invention, a drive means for imparting rotation to coiler member **16** comprises an annular ring gear broadly designated at **40** and provided with externally and internally toothed surfaces **41**, **42**, respectively (FIGURE 4). Ring gear **40** is substantially concentric with and positioned above spectacle **10**. Also, ring gear **40** is supported by spectacle **10**, but rotation thereof is effected independently of rotation of spectacle **10**. Accordingly, an upwardly extending projection on ring gear **40** has a radially inwardly projecting bead portion or annular trackway **44** thereon which is engaged by a plurality of circumferentially spaced, peripherally grooved rollers **45** rotatably mounted on respective posts **46** which extend downwardly and are carried by the base **10***a* of spectacle **10** (see right-hand portion of FIGURE 2).

The externally toothed surface **41** of ring gear **40** is meshingly engaged by drive gear **34** (FIGURE 1) for rotating ring gear **40**, and the internally toothed surface **42** of ring gear **40** meshes with an externally toothed surface **50**, constituting a coiler gear, surrounding the upper portion of the annular flange of coiler member **16** and located above trackway **23**. Thus, it can be seen that ring gear **40** transmits rotation to coiler member **16** at a substantially higher speed than that of spectacle **10**, and that the exit passage **20** in coiler member **16** moves in an epicyclical manner whereby the axis B of coiler member **16** moves in an orbital path about main axis A.

Calender rolls, and supporting driving means therefor, will now be described.

Positioned substantially centrally above coiler member **16** is a pair of calendar rolls **52**, **53** which are arranged to move in an orbital path corresponding to the orbital path of the axis B of coiler member **16** about axis A of spectacle **10**. The strand material or sliver S passes from a suitable source, not shown; such as the drafting rolls of a draw frame or the doffer of a card, and passes through a trumpet or condensing member **54** positioned above and movable with calender rolls **52**, **53** in said orbital path. The lower end of the trumpet terminates in close proximity to the nip of calender rolls **52**, **53**.

As shown, and as is preferred, calender rolls **52**, **53** are spaced substantially above coiler member **16** and a guide means in the form of an inclined tube **56** is positioned between calender rolls **52**, **53** and coiler member **16** for guiding the strand material to the eccentrically located exit passage **20** of coiler member **16** and thereby directing and coiling the strand material or sliver S into can **17**.

To facilitate locating the calender rolls **52**, **53** so they intersect the rotational axis B of coiler member **16**, calender rolls **52**, **53** are supported and driven in a novel manner. To this end, the shafts **52***a*, **53***a* of the respective calender rolls **52**, **53** are rotatably mounted in respective bearing members **60**, **61**. Bearing member **61** is attached to bearing member **60** through a suitable toggle mechanism or linkage **63** of well known type, and bearing member **60** is fixed to a cantilever arm **65** whose outer portion is adjustably mounted on a composite bracket or

support member broadly designated at **66**. Arm **65** may be releasably secured in operative position by means of arcuate slots **65***a* and screws **65***b*, but may be swung on bracket **66** to permit easy access to coiler member **16**, when desired. Support member **66** extends downwardly and is suitably secured to spectacle **10**, as best shown in FIGURE **2**.

The outer end of shaft **52***a*, remote from calender roll **52**, has a bevel gear **70** fixed thereon which meshes with a bevel gear **71** on the upper end of an upright jack shaft **72** suitably journaled in support member **66**. The lower portion of jack shaft **72** has a gear **73** fixed thereon which meshes with an idler gear **74** which, in turn, meshes with coiler gear **50**, thus providing means operable independently of the spectacle **10** for transmitting rotation from coiler member **16** to calender rolls **52**, **53**.

It is apparent that the transmission means embodied in gears **70**, **71**, **73**, **74** is such that the peripheral speed of calender rolls **52**, **53** corresponds substantially with the rate at which the strand material or sliver S is being received in the stationary can **17** in the course of the epicyclical motion of the exit passage **20** in coiler member **16**, taking into consideration the maintenance of suitable tension draft in the sliver S in its course between calender rolls **52**, **53** and the package being formed in stationary can **17**.

In order to shield the calender rolls **52**, **53**, the spectacle **10**, the coiler member **16** and associated parts from excessive accumulations of lint and foreign matter thereon during operation of the planetary coiler, an auxiliary housing **80**, whose lower portion is preferably circular, rests upon and may be suitably secured to main housing **12**. Although it is not entirely necessary, it is preferred that the upper portion of auxiliary housing **80** tapers upwardly, as shown in FIGURE 2. Since trumpet **54** must move in an orbital path corresponding substantially to the orbital path of the axis B of coiler member **16**, the upper portion or end of auxiliary housing **80** is provided with a relatively large opening **81** therein into which the upper portion of trumpet **54** extends, and the trumpet **54** is mounted in a suitable bracket **82** which, together with an overlying cover or cap **83**, is suitably removably secured to bearing member **60**. Cover **83** overlies and normally closes opening **81** in the upper end of auxiliary housing **80**. Further, cover **83** is provided with a relatively small opening **85** which is located eccentrically of the axis of rotation of cover **83** to accommodate the upper portion of trumpet **54** or, at least, to facilitate the entrance of sliver S into trumpet **54** and thus to calender rolls **52**, **53**.

Although the planetary coiler has been described with the axes A, B of the spectacle **10** and the coiler member **16** extending in a vertical direction, and with the calender rolls **52**, **53** positioned above coiler member **16**, it is apparent that the entire planetary coiler may be inverted so that the calender rolls **52**, **53** are positioned below coiler member **16**, or the entire planetary coiler may be positioned in any desired angular attitude, without departing from the spirit of the invention. In other words, the particular attitude of the various parts of the planetary coiler and the relationship thereof are set forth in the specification and claims for descriptive purposes only. By way of example, reference is made to United States Patent No. 3,345,702 granted to Hermann Miedler et al. on Oct. 10, 1967, wherein coilers are shown whose axes extend at different angles, and also wherein calender rolls are located to one side of or beneath a coiler member or tube gear.

SECOND EMBODIMENT OF THE INVENTION

Referring to FIGURES 5 and 6, the second embodiment of the planetary coiler there shown is quite similar to the first embodiment shown in FIGURES 1–4 with the important exception of the manner in which the coiler member is rotatably supported by the spectacle, and the

means for transmitting rotation from the ring gear to the coiler member. Therefore, those parts shown in FIGURES 5 and 6 which are substantially the same as corresponding parts shown in FIGURES 1–4 will bear the same reference characters, where applicable, with the prime notation added, in order to avoid repetitive description of these particular parts.

Although the bead or annular trackway **44'** of ring gear **40'** is shown in FIGURE 5 positioned below the external and internal toothed surfaces **41'**, **42'**, ring gear **40'**, as well as spectacle **10'** may be supported for relative rotation in the same manner as that described with respect to FIGURES 1–4. In order that the rotational speed of ring gear **40'** may be reduced as compared to the speed of ring gear **40** in order to impart a given speed of rotation to the respective coiler members **16**, **16'**, it will be observed in FIGURE 6 that the internal toothed surface **42'** of ring gear **40'** is spaced from and therefore does not engage the gear **50'** of coiler member **16'**. Instead, a step-up gear transmission means is provided between the ring gear **40'** and coiler member **16'**.

As shown in FIGURES 5 and 6, coiler member **16** is provided with a coiler gear **90** which is preferably of substantially lesser diameter than coiler gear **50'**. Coiler gear **90** is substantially concentric with coiler member **16'**. In order that coiler gear **90** may be located above the level of the upwardly projecting annular flange of coiler member **16'**, the base **16*a'*** of coiler member **16'** is provided with a centrally disposed post or standard **91** integral therewith or suitably secured thereto. An upper portion of standard **91** has the coiler gear **90** fixed thereon and, in this instance, the inclined tube **56'** extends upwardly through gear **90**.

Coiler gear **90** is engaged by a relatively large intermediate gear **93** journaled on a stub shaft **94** carried by a bracket **95** suitably secured to spectacle **10'**. A smaller intermediate gear **96** is suitably attached in fixed axial relation to gear **93** and meshes with a pinion **97**. The pinion **97** engages the internal toothed surface **42'** of ring gear **40'**. Thus, the driven ring gear **40'** transmits rotation to coiler member **16'** through the gears **97**, **96**, **93**, **90**, in that order, so that the peripheral surface of coiler member **16'** moves at a substantially faster linear speed than the linear speed of the internal toothed surface **42'** of ring gear **40'**. In FIGURE 5, the first coiler gear **50'** is shown, because it serves to drive calender rolls **52'**, **53'** as in the first embodiment.

Instead of supporting the coiler member **16'** on spectacle **10'** by means of a plurality of circumferentially spaced rollers as is the case in the first embodiment of the invention shown in FIGURES 1–4, the annular trackway or bead, such as the trackway **23** of FIGURE 2, is not required or may be omitted from coiler member **16'** as shown in FIGURE 5, and the upper end portion of standard or post **91** is enlarged, as at **100**, and is pressed into the inner race of an antifriction bearing or ball bearing member **101** of substantially lesser diameter than coiled member **16'**. The enlarged portion **100** of post **91** is shown located above gear **90**, is also penetrated by sliver guide tube **56'**, and is suitably secured in the inner race of antifriction bearing member **101**.

The outer race of antifriction bearing member **101** is mounted in a support member **102** spaced above and overlying coiler member **16'**. Support member **102** is a portion of a spider-like bracket and has a plurality of radially outwardly extending arms **103** thereon which extend downwardly past the flange of coiler member **16'**, and whose lower portions are provided with suitable foot portions **104** penetrated by suitable screws **105** for securing the same to the upper surface of the base **10*a'*** of spectacle **10'**. It is thus seen that coiler member **16'** is rotatably suspended, at its central upper portion, from the support member or bracket **102**. The antifriction bearing member **101** and support member **102** also serve to maintain the stepped lower portion of coiler member **16'** out of engagement with the wall of opening **15'** formed in the base **10*a'*** of spectacle **10'**.

In order to lend stability to the coiler member **16'** during rotation thereof, the outer peripheral surface of the upwardly projecting annular flange of coiler member **16'** is engaged by a plurality of circumferentially spaced rollers **110**, supported for rotation on respective vertical axes, on posts **111** carried by and projecting upwardly from spectacle **10'**.

It should be noted that rollers **110** have no supporting function insofar as supporting the weight of coiler member **16'** is concerned, but the peripheral surfaces thereof engage the common outer peripheral surface of the upstanding flange portion of coiler member **16'** to insure that the lower portion of coiler member **16'** is stabilized and rotates in a concentric manner at all times. Thus the lower planar surface of coiler member **16'** remains properly aligned with and flush with the lower planar surface of spectacle **10'** at all times during operation of the planetary coiler of FIGURES 5 and 6.

THIRD EMBODIMENT OF THE INVENTION

The third embodiment of the invention is concerned only with the drive means for transmitting rotation to the coiler member and, accordingly, only such drive means is shown schematically in FIGURE 7. Those parts shown in FIGURE 7 corresponding to similar or like parts in FIGURES 5 and 6 will bear the same reference character with the double prime notation added where applicable. As shown in FIGURE 7, coiler member **16''** is rotatably supported by spectacle **10''** in the same manner as that described with respect to FIGURES 5 and 6, although it is to be understood that coiler member **16''** may be mounted in the same manner as coiler member **16** of FIGURES 1, 2 and 4. While the coiler gear **90** of FIGURE 6 need not necessarily be of lesser diameter than coiler member **16'** in order to cause coiler member **16'** to rotate at a faster peripheral speed than the linear speed of the inner internal toothed surface **42'** of ring gear **40'**, it will be observed in FIGURE 7 that only a single intermediate gear **115** is interposed between the internal toothed surface **42''** of ring gear **40''** and the coiler gear **90''**. Thus, in this instance, it is necessary that the coiler gear **90''** is of a substantially lesser diameter than the diameter of coiler member **16''** in order to insure that the linear speed of the periphery of coiler member **16''** is substantially greater than the linear speed of the internal toothed surface **42''** of ring gear **40''**. This is believed to be necessary in respect to FIGURE 7 since the linear speed of the teeth of intermediate gear **115** is the same as the linear speed of the internal toothed surface **42''** of ring gear **40''**, and thus, the linear speed of the toothed peripheral surface of coiler **90''** is the same as that of the internal toothed surface **42''** of ring gear **40''**. In all other respects, the third embodiment of the invention shown in FIGURE 7 may be identical to that shown and described with respect to FIGURES 5 and 6, and accordingly, a further detailed description thereof is deemed unnecessary.

It is thus seen that I have provided an improved planetary coiler for coiling strand material into a stationary container and wherein a driven rotary spectacle is supported in the coiler housing by means of a plurality of spaced rollers engaging an annular trackway, and also wherein calender rolls supported by the spectacle are substantially centrally disposed above an eccentric coiler member rotatably supported by the spectacle, with simplified power transmission means for rotating the coiler member and the calender rolls. Since the calender rolls rotate bodily in an orbital path about the axis of the spectacle, and with the spectacle, they move much slower than the coiler member, thereby facilitating the positioning and feeding of strand material to the trumpet and calender rolls while the coiler is in operation.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in claims.

I claim:

1. A planetary coiler comprising a housing, a driven rotary spectacle, means rotatably supporting said spectacle in said housing and comprising a plurality of spaced rollers and trackway means engageable therewith, a rotary coiler member eccentrically positioned in said spectacle and having an eccentrically located strand exit passage therethrough, an annular bearing of substantially lesser diameter than said coiler member and carried by said spectacle in concentric relation to said coiler member, means on said coiler member engaging said annular bearing and rotatably supporting said coiler member therefrom, calender rolls positioned substantially centrally above said coiler member, means supporting said calender rolls on and for movement with said spectacle, guide means positioned between said calender rolls and said coiler member for guiding strand material to said exit passage, means including a coiler gear transmitting

rotation to said coiler member such as to rotate the same about its axis relative to and faster than said spectacle, and gear means operatively connecting said coiler gear to said calender rolls for driving said calender rolls.

2. A structure according to claim 1, including spaced rollers carried by said spectacle in surrounding relation to said coiler member for stabilizing said coiler member during rotation thereof.

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DORSEY NEWTON, Primary Examiner