Dec. 5, 1967 J. R. WHITEHURST 3,355,775

PLANETARY COILER HEAD

Filed July 21, 1966 5 Sheets-Sheet 1

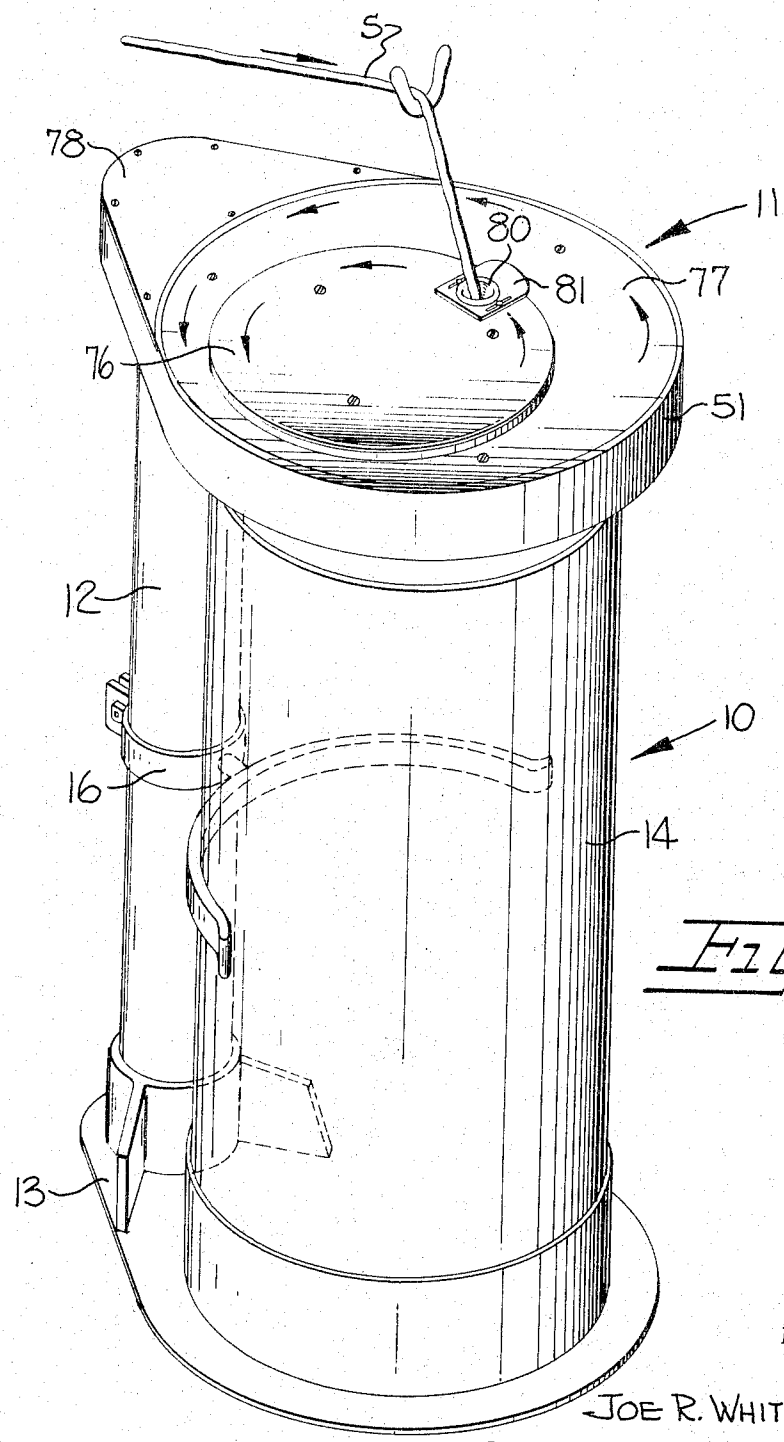


Fig-1

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PLANETARY COILER HEAD

Filed July 21, 1966 5 Sheets-Sheet 2

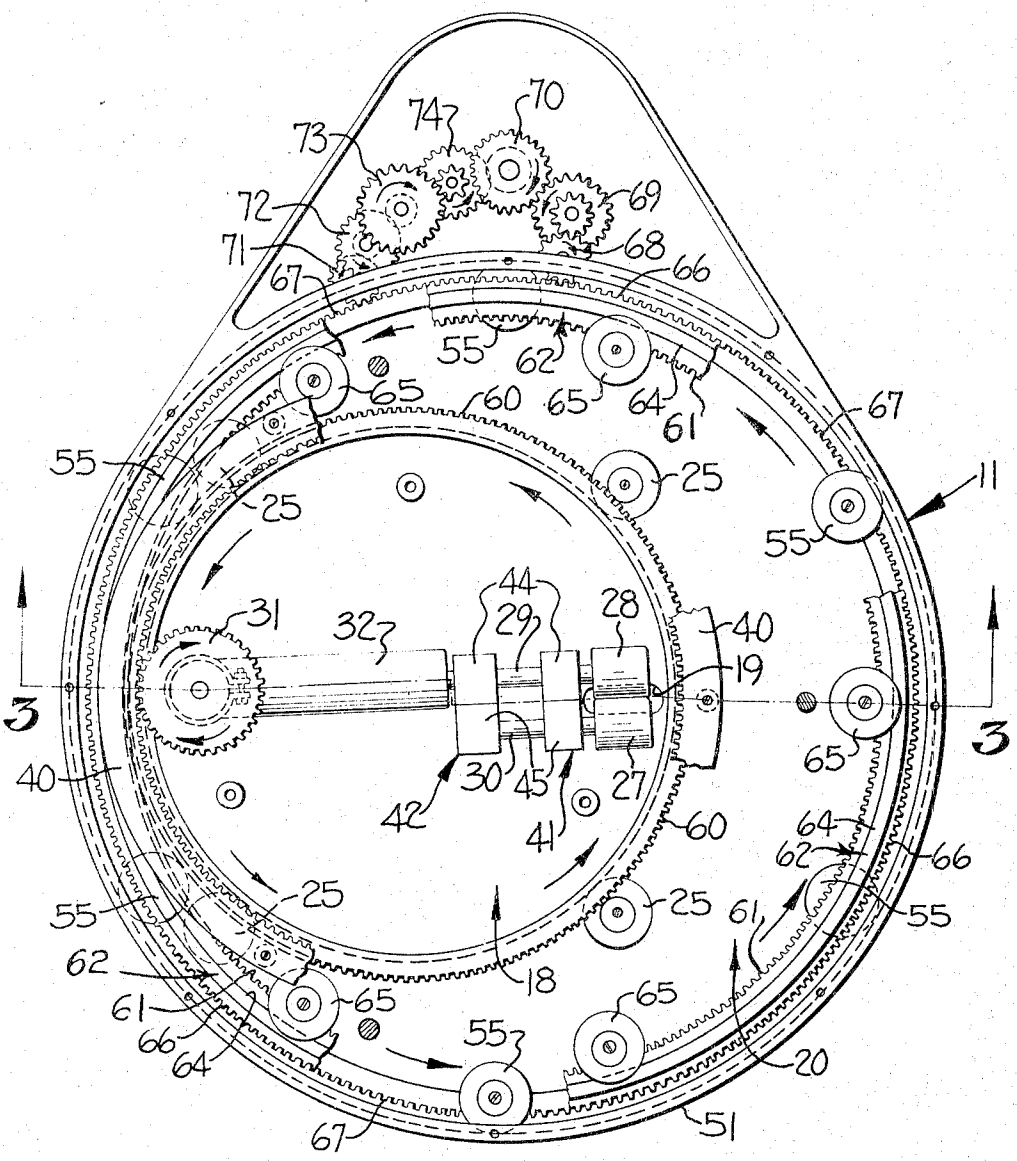


Fig-2

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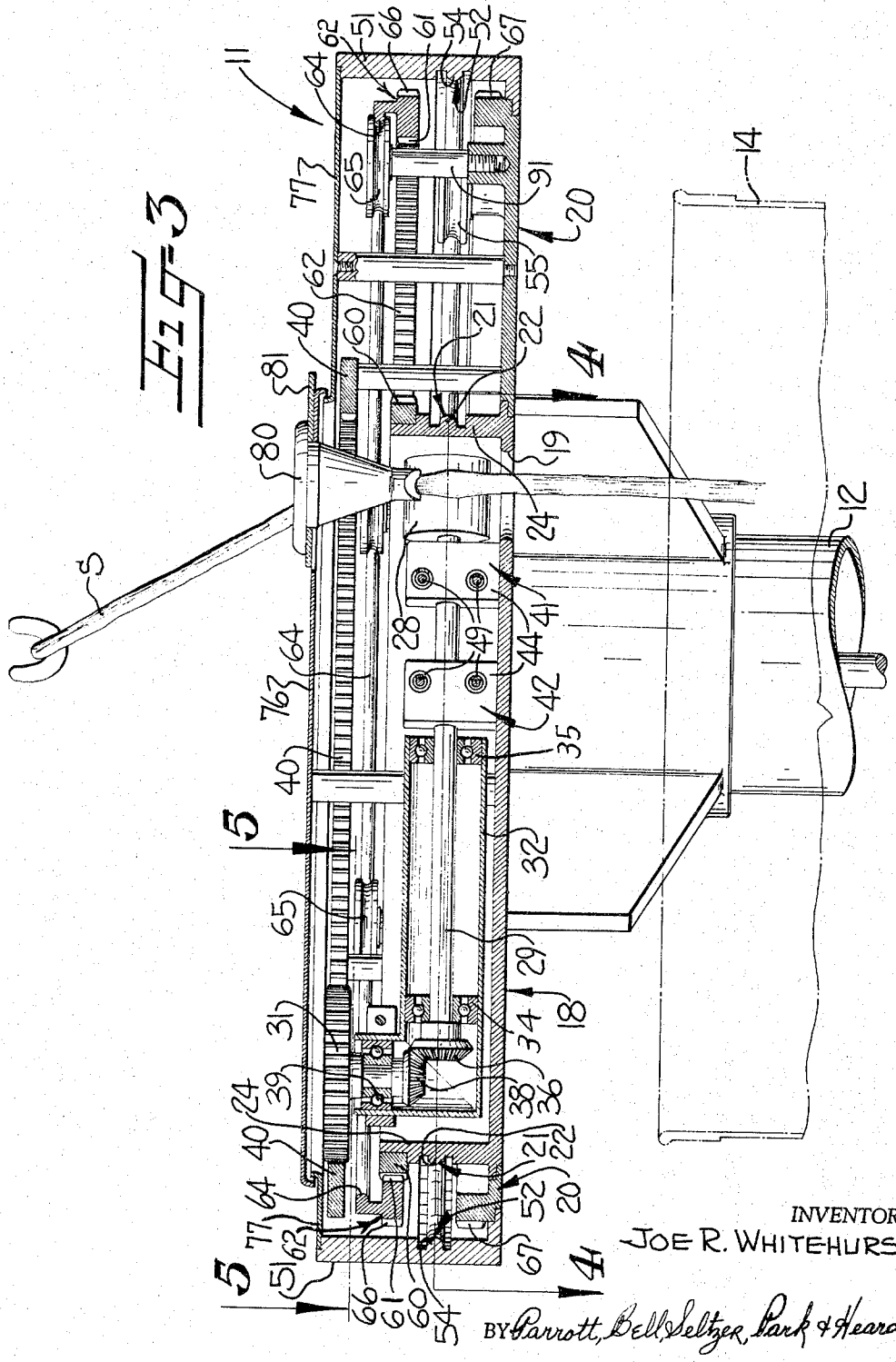
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PLANETARY COILER HEAD

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Fig. 3



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Filed July 21, 1966

5 Sheets-Sheet 4

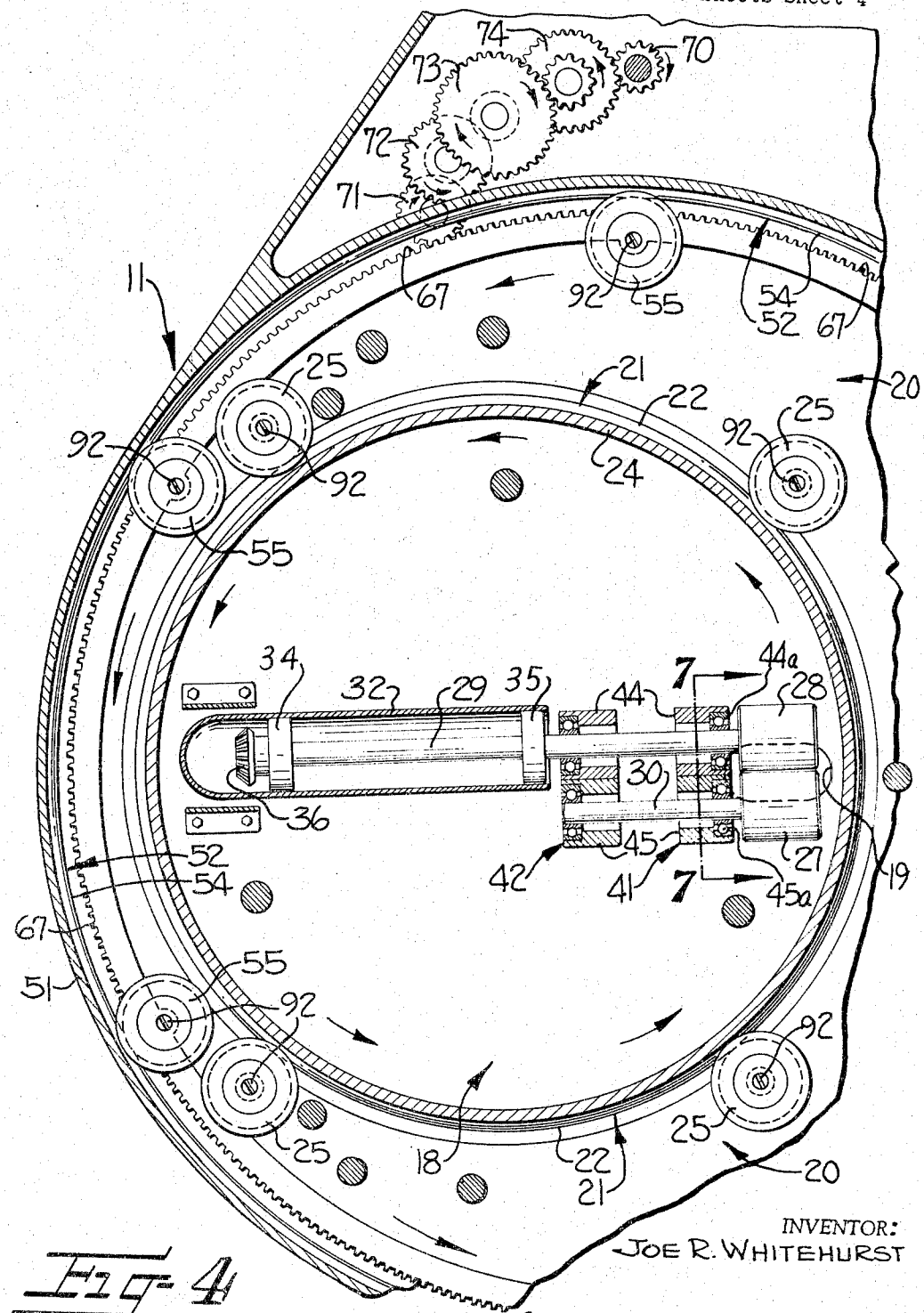


Fig. 4

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Dec. 5, 1967 J. R. WHITEHURST 3,355,775

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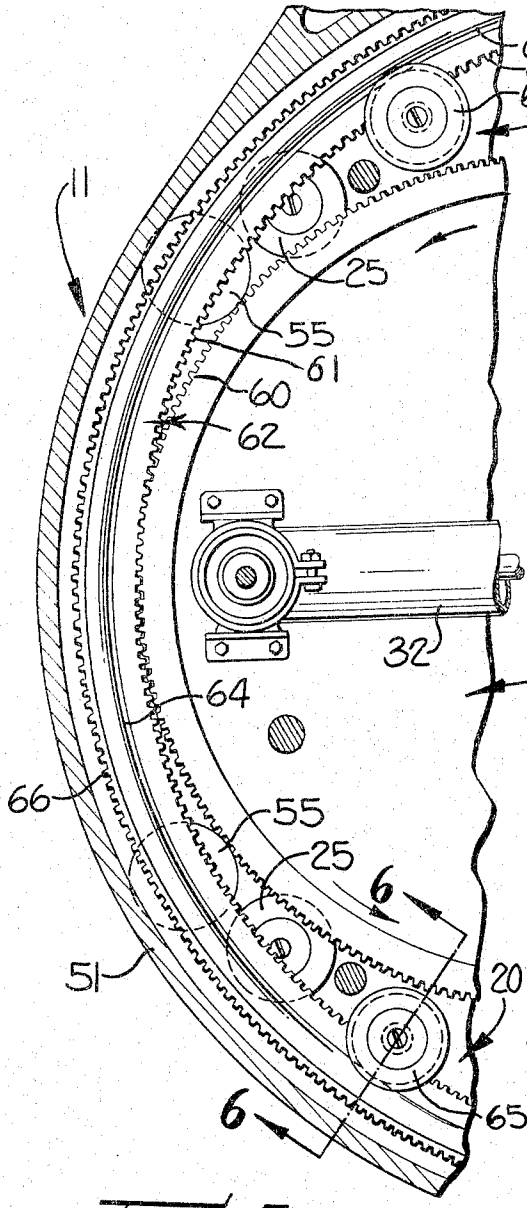


Fig-5

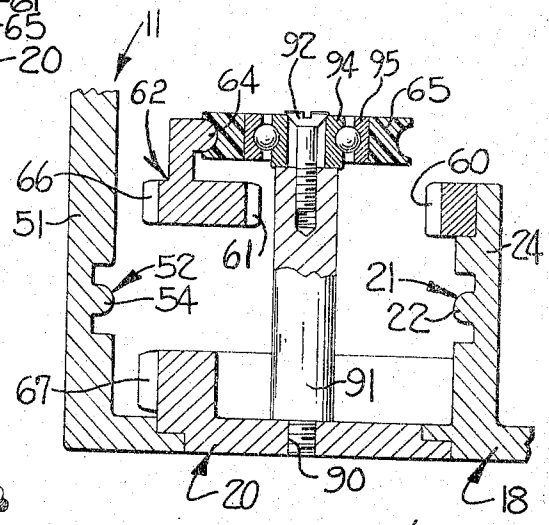


Fig-6

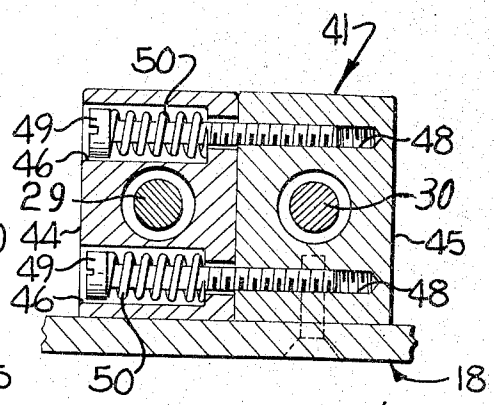


Fig-7

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United States Patent Office

3,355,775

Patented Dec. 5, 1967

3,355,775

PLANETARY COILER HEAD

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Filed July 21, 1966, Ser. No. 566,870
12 Claims. (Cl. 19—159)

ABSTRACT OF THE DISCLOSURE

The main rotational components of the planetary coiler are supportingly interrelated by cooperating rollers and trackways for low-friction rotational movement of the components, and wherein the rollers and trackways cooperate to maintain the lower faces of the main components in a common horizontal plane and to prevent relative vertical movement between the components.

This invention relates to a planetary coiler head and, more particularly, to a coiler head adapted to package textile sliver in a stationary receptacle positioned therebeneath by depositing the sliver in a plurality of successive convolutions compacted into the receptacle.

In recent years, textile manufacturers have successfully reduced the frequency of handling packages of materials in process, and the costs attendant to such handling, through the use of larger package sizes. In accordance with this trend, increasingly larger sliver cans have gained usage in the packaging of textile sliver by sliver coilers. While the frequency of handling has been reduced through the use of larger cans, other difficulties are introduced in that the large diameter cans are difficult to mount and remove from a can table of a conventional coiler and transport of the cans within the mill has become a problem. Attempts to solve the problem of transporting larger diameter cans have been made by mounting casters on the cans, but this merely compounds the difficulty in that caster-mounted cans are still more difficult to mount and remove from a can table.

Planetary coilers have heretofore been known to avoid certain difficulties which have been introduced by larger diameter cans, particularly as planetary coilers do not require can tables. However, such coilers have not heretofore obtained wide acceptance due to their high cost and other deficiencies.

In an additional effort toward packaging greater running lengths of sliver without interruption, textile manufacturers compact sliver coiled into a receptacle so as to pack the greatest possible length in the available can volume. Compacting of sliver into a can requires a vertically directed force on the package of sliver within the receptacle as the sliver is deposited in a predetermined convoluted path to be formed into the package. During the application of a compacting force, those elements of a sliver coiler which overlie the package being compacted will disrupt and distort the sliver package if relative vertical movement of the elements is permitted.

With the foregoing in mind, it is an object of this invention to provide an improved planetary coiler head which avoids the difficulties and deficiencies described above, by packaging textile sliver in a stationary receptacle positioned beneath the coiler head and compacting the sliver into the receptacle, and which has supporting and drive arrangements which are readily manufactured and assembled, permit high speed operation, and provide other advantages.

A further object of this invention is to provide a coiler head as described above wherein first and second members are mounted for rotation about respective first and second axes, with planar lower surfaces thereof aligned,

and supported against relative vertical movement, so that a sliver passage opening through the first member is translated along a predetermined convolute path to deposit sliver passing therethrough in a desired pattern within a stationary receptacle positioned therebeneath and so that sliver deposited in the receptacle is compacted therein.

Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a textile sliver coiler including the planetary coiler head of this invention;

FIGURE 2 is a plan view of the coiler head of FIGURE 1, partially broken away;

FIGURE 3 is an elevation view, in section, of the coiler head of FIGURE 2, taken substantially along the line 3—3 in that figure;

FIGURE 4 is a plan view, in partial section, of a portion of the coiler head of FIGURE 2, taken substantially along the line 4—4 in FIGURE 3;

FIGURE 5 is a plan view similar to FIGURE 4 taken substantially along the line 5—5 in FIGURE 3;

FIGURE 6 is an elevation view, in partial section, of a portion of the coiler head of FIGURE 2, taken substantially along the line 6—6 in FIGURE 5; and

FIGURE 7 is an elevation view, in section, of a portion of the mounting arrangement for the calender rolls of the coiler head of FIGURE 2, taken substantially along the line 7—7 in FIGURE 4.

Referring now more particularly to the drawings, a textile sliver coiler is there shown (FIGURE 1), and generally indicated at **10**, which includes a planetary coiler head **11** as comprehended by the present invention. The planetary coiler head **11** is supported by a suitable standard **12** and floor plate or base **13** to which the standard **12** is attached so as to overlie a sliver receptacle or can **14**. Preferably, a guide means such as a bracket **16** is mounted on the standard **12** so as to receive the can **14** and assure positioning of the can in the proper location beneath the planetary coiler head **11**. In operation of the coiler **10**, textile sliver S is supplied to the planetary coiler head **11** and is deposited in the stationary can **14** in a predetermined convoluted path and packaged by being compacted therein. During such packaging operations, the can **14** remains stationary.

Deposition of the sliver S in the required convolute path within the can **14** is obtained by the coil forming rotation of a first member **18** (FIGURE 2) of the coiler head **11** and the coil precessing rotation of a second member **20** of the coiler head **11**. The first member **18** has an opening **19** therein for the passage of sliver therethrough and a substantially planar lower surface and is encircled by the second member **20** which has a circular opening therein, within which the first member **18** is disposed, and a substantially planar lower surface.

First support means are provided for mounting the first member **18** on the second member **20** for rotation relative thereto and about a first predetermined axis. The first support means is constructed so that the planar lower surfaces of the first and second members **18** and **20** are substantially aligned (FIGURE 3) and vertical movement between the members is substantially restrained, for facilitating compacting of sliver deposited in a can by the head **11**. Preferably, the support means comprises a first trackway means **21** including a radially projecting bead portion **22**, which defines an annular trackway concentric with the circular opening in the second member **20** and is formed integrally with an upstanding rim **24** of the first member **18** (FIGURES 3 and 6). A plurality of circumferentially spaced peripherally grooved rollers **25** (FIGURES 2 and 4) are mounted on the second member

20 and rotatively engage the bead portion 22 for supporting the first member 18 for rotation while restraining vertical movement of the first member with respect to the second member.

In accordance with this invention, means are carried on the first member 18 for advancing sliver through the sliver passage opening 19. The sliver advancing means comprises a pair of calender rolls 27, 28 mounted on the first member 18 for rotation therewith about the first axis and supported thereon for rotation about their horizontally extending axes for feeding sliver through the sliver passage opening 19. Each of the calender rolls 27, 28 is secured to a respective one of a pair of calender roll shafts 29, 30, and one of the calender roll shafts (namely the shaft 29) is connected by a right angle drive arrangement to a calender roll drive gear 31. The right angle drive arrangement includes a transmission housing 32; suitable bearings 34, 35 within the housing 32 for supporting the roll shaft 29; a first right angle gear 36 fixed to an extremity of the shaft 29; a second right angle gear 38 meshing with the first angle gear 36; and a stub shaft connecting the drive gear 31 to the second right angle gear 38 and mounted within the housing 32 by an antifriction bearing 39.

In order to impart rotation to the calender roll 27, a ring gear 40 (FIGURES 2 and 3) is fixed to the second member 20 for rotation therewith about the second axis and to overlie the first member 18 and be concentric with the first axis. Upon rotation of the first member 18 about the first axis, the calender roll drive gear 31 is traversed along the internal toothed surface of the ring gear member 40, and the meshing relationship therebetween drives the calender roll drive gear 31 in rotation.

In order to properly grip sliver S between the calender rolls 27 and 28, and to ensure feeding thereof through the sliver passage opening 19 upon rotation of the calender roll 27 as described above, means are provided for mounting the calender roll shafts 29, 30 to urge the calender rolls together while permitting straight line separation movement therebetween to accommodate thickness variation in sliver S passing therethrough. More particularly, a pair of mounting blocs 41, 42 (FIGURES 2–4 and 7) are provided to mount the calender roll shafts 29, 30 for rotation while permitting separating movement of the calender rolls 27, 28. Each of the mounting blocks (such as the block 41 in FIGURE 7) comprises two segments 44, 45, each of which is penetrated by a respective one of the calender roll shafts 29, 30 and encircles an antifriction bearing 44*a*, 45*a* mounting the shaft for free rotation. One segment 44 is penetrated by a pair of counterbored passages 46, while the other segment 45 has a pair of threaded openings 48 therein. Bolts 49 are received within the counterbored passages 46 with spring members 50 encircling the bolts between the heads thereof and the inner end of the enlarged portion of the passages 46. The smaller diameter portions of the passages 46 are sized to closely engage the bolts 49, which are threaded into the openings 48 of the other segment 44. As the pair of bolts 49 are drawn into the threaded openings 48, the springs 50 are tensioned to bias the calender roll shafts 29, 30 together.

Due to the reduced diameter portions of the countersunk passages 46 and the engagement of those portions with the bolts 49, separating movement of the shafts 29, 30 against the biasing force of the spring 50 is restrained to straight line movement only. Due to the biasing force acting on the calender rolls, 27, 28, it is not necessary to drive the calender roll 28 but reliance may be placed upon the rotation of that roll in conjunction with the rotation of the roll 27.

Upon rotation of the first member 18 with respect to the second member 20, so that the calender rolls 27, 28 are driven to advance sliver S through the sliver passage opening 19, sliver advanced through the opening is formed into successive coils about the first axis.

The first member 18 and second member 20 are encircled by a third member 51, which functions as a stationary housing for the coiler head 11 and has a circular opening therein and a substantially planar lower surface (FIGURES 2 and 3). Second support means are provided for mounting the second member 20 on the third member 51 for rotation relative thereto about a second axis parallel to and spaced from the first axis, and for substantially restraining vertical movement between the second and third members so as to facilitate compacting sliver advanced through the sliver passage opening 19 into the can 14. Preferably, the second support means is similar to the first support means and comprises a second trackway means 52 (FIGURE 6) including a radially projecting bead portion 54 formed integrally with the third member 51 and defining an outer annular trackway concentric with the circular opening in the third member 51. Further, a plurality of circumferentially spaced peripherally grooved rollers 55 similar to the rollers 25 mentioned heretofore are mounted on the second member 20 for engaging the bead portion 54 of the outer annular trackway.

Upon simultaneous and coordinated rotation of the first member 18 about the first axis and the second member 20 about the second axis, as described more fully hereinafter, the second member 20 operates to precess the location of the sliver coils which are formed by the first member 18, and to assure that the sliver passage opening 19 is traversed along a predetermined convolute path.

In order to drive the first and second members in coordinated rotation about the first and second axes respectively, and to translate the sliver passage opening 19 along the predetermined convoluted path of travel, means are provided for engaging the members and connecting the same to a rotative motive means. More particularly, the first member 18 includes an externally toothed surface 60, located above the first trackway means 21. This externally toothed surface 60 is engaged by an internally toothed surface 61 of a ring gear member 62 (FIGURES 2, 3, and 6) for driving the first member 18 in rotation about the first axis. Third support means are provided for mounting the ring gear member 62 on the second member 20 for rotation relative to the second member and about the second axis.

As illustrated in FIGURE 6, the third support means comprises a third trackway means in the form of an upwardly extending projection on the ring gear 62 which has a radially projecting bead portion 64 defining an upper annular trackway concentric with the second axis. A plurality of circumferentially spaced peripherally grooved rollers 65 mounted on the second member 20 rotatively engage the bead portion 64 to support the ring gear member 62 for rotation above the second member 20 and in driving engagement with the toothed peripheral portion 60 of the first member 18.

Each of the third support means rollers 65 is mounted on the second member 20 by means of a stud arrangement (FIGURE 6). The second member 20 has a number of threaded openings 90 formed therein and a number of studs or standards 91, of a suitable height, are secured to the second member 20 by engagement with the threaded openings. The upper extremity of each standard 91 is provided with a threaded opening to receive a flat headed bolt 92, which penetrates the inner race 94 of an antifriction bearing, and secures the inner race to the second member 20. A peripherally grooved member is fitted onto the outer race 95 of the antifriction bearing, in the form of roller 65, and the peripheral groove thereof is preferably coated with a low-friction plastic material, in order to provide a low friction treatment for one of the rotatively engaging surfaces of the bead portion 64 and the roller 65. By careful placement of the threaded openings 90 in the second member, reliance may be placed on the engagement of the conical shoulder of the flat

head bolts 92 with the inner races 94 to properly position each of the plurality of rollers 65.

The first and second supporting means rollers, 25 and 55 respectively, are similarly mounted on the second member 20 through the use of threaded studs similar to the standards 91. The height of the standards employed in mounting the first and second support means rollers 25 and 55 is determined by the spacing of the respective trackway means above the second member 20. Preferably, all of the rollers 25, 55, and 65 are provided with a low friction material coating as described above.

Both the ring gear member 62 and the second member 20 are provided with externally toothed portions 66 and 67, respectively. The externally toothed portions 66 and 67 are concentric about the second axis and are substantially vertically aligned.

In order to simultaneously drive both the first member 18 and the second member 20 in coordinated rotation, gear train means (FIGURE 2) are provided for connecting the externally toothed portions 66 and 67 of the ring gear member 62 and the second member 20 to a common power input shaft. More particularly, for the ring gear 62, the train of gears includes gears 68 and 69 to transmit rotation from a main gear 70 to the ring gear 62. For the second member 20, the train of gears includes gears 71–74 for transmitting rotation from the main gear 70 to the toothed portion 67 of the second member 20. The ring gear member 62 is driven in rotation about the second axis at a higher speed than the second member 20, inasmuch as translation of the sliver passage opening 19 along the desired convolute path necessitates that the first member 18 be rotated about the first axis at a substantially higher speed than the second member 20 is rotated about the second axis.

In order to assure proper passage of sliver S through the coiler head 11 of this invention, to be deposited into a receptacle such as the can 14, and to protect the operating elements of the coiler head 11, this invention provides cover members 76, 77 and 78 overlying the operating elements and a sliver guide means including a trumpet 80 mounted on a cover member for determining the path of sliver to the pair of calender rolls 27 and 28. Two of the cover members, 76 and 77 (FIGURES 1 and 2), are circular members having substantially the same general circular form as the first member 18 and the second member 20, respectively. The smaller circular cover member 76 is secured to the first member 18, as by means of bolts penetrating cover member 76 and secured in studs fixed to the first memebr 18, for rotation therewith about the first axis, while the larger circular cover member 77 is similarly secured to the second member 20 for rotation therewith about the second axis. A generally triangular member 78 extends over the portion of the third member 51 which encloses the gear trains 68–74.

In order to guide the sliver S to the calender rolls 27, 28, a sliver trumpet member 80 is mounted in a slidable plate member 81 which in turn is mounted on the smaller circular cover member 76 to overlie the calender rolls 27 and 28. The trumpet member 80 and mounting plate 81 may be adjustable along the nip of the calender rolls in order to obtain variable throw for the sliver coiler head 11.

In operation, the main gear 70 is driven in rotation from any suitable motive means, such as an electric motor or by interconnection to a textile machine, thereby driving the ring gear 62 and the second member 20 in rotation. The ring gear member 62 in turn similarly drives the first member 18 in rotation relative to the second member 20. By the engagement of the calender roll drive gear 31 with the calender roll ring gear 40, the calender rolls 27, 28 are driven in rotation to advance sliver S passing through the trumpet member 80 through the sliver passage opening 19 to be deposited in a suitable receptacle underlying the coiler head 11, such as the can 14. Due to the different rotational speeds of the first member 18 and the second member 20, coils are formed generally about the first axis by the rotation of the first member 18 and the coils are precessed about the second axis by the slower rotation of the second member 20. As sliver is formed into coils and the coil location precessed relative to the container 14 a column of sliver builds within the container, occupies the space beneath the aligned planar lower surfaces of the first, second and third members 18, 20 and 51 of the coiler head 11, and is compacted into the can as the same is advanced through the sliver passage opening 19. As sliver is compacted, the vertical compacting force would tend to raise the first and second members 18 and 20 of the coiler head 11, but for the restraint imposed by the first and second mounting means described above. Due to the operation of the mounting means, the substantially aligned condition of the planar lower surfaces is maintained, and disruption or distortion of the sliver during packaging is minimized.

In the drawings and specification, there has been set forth a preferred embodiment 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 the claims.

I claim:

1. A planetary coiler head adapted to package textile sliver in a stationary receptacle positioned therebeneath by depositing the sliver in a plurality of successive convolutions compacted into the receptacle and comprising:

a first member having an opening therein for the passage of sliver therethrough and a substantially planar lower surface,

means carried by said first member for advancing sliver through said sliver passage,

a second member encircling said first member and having a substantially planar lower surface,

first support means mounting said first member on said second member for rotation relative thereto about a first predetermined axis and with the lower surfaces thereof substantially aligned and for substantially restraining vertical movement therebetween so as to facilitate compacting of sliver advanced through said sliver passage opening,

said first member upon rotation thereof forming sliver advanced by said sliver advancing means into successive coils,

a third member encircling said second member,

second support means mounting said second member on said third member for rotation relative thereto about a second predetermined axis parallel to and spaced from said first axis and for substantially restraining vertical movement between said second and third members so as to facilitate compacting of sliver advanced through said sliver passage opening,

said second member upon rotation thereof precessing the location of the sliver coils formed by said first member, and

means for driving said first and second members in coordinated rotation about said first and second axes respectively to translate said sliver passage opening along a predetermined convoluted path of travel.

2. A coiler head as claimed in claim 1 wherein said first support means comprises:

first trackway means including a radially projecting bead portion carried by one of said first and second members and defining an annular trackway, and

a plurality of circumferentially spaced peripherally grooved rollers carried by the other of said first and second members and rotatively engaging said bead portion.

3. A coiler head as claimed in claim 2 wherein said first trackway means is carried by said first member, and the rotatively engaged surfaces of one of said bead por-

ions and of said plurality of rollers are formed of low friction material.

4. A coiler head as claimed in claim 2 wherein said second support means comprises:

second trackway means including a radially projecting bead portion carried by one of said second and third members and defining an outer annular trackway, and

a plurality of circumferentially spaced peripherally grooved rollers carried by the other of said second and third members and rotatively engaging said outer bead portion.

5. A coiler head as claimed in claim 4 wherein said second trackway means is carried by said third member, and the rotatively engaged surfaces of one of said bead portions and of said plurality of rollers are formed of low friction material.

6. A coiler head as claimed in claim 1 wherein said third member has a substantially planar lower surface and said second support means mounts said second member with said planar lower surfaces of said second and third members substantially aligned.

7. A coiler head as claimed in claim 1 wherein said sliver advancing means comprises a pair of calender rolls mounted on said first member for rotation therewith and supported thereon for rotation for feeding sliver through said sliver passage opening, a ring gear mounted on said second member for rotation therewith about said second axis and fixed thereon overlying said first member and concentric with said first axis and gear means mounted on said first member for rotation therewith and engaging said ring gear and operatively connected to one of said calender rolls for driving the same in rotation as said first member rotates about said first axis and relative to said second member.

8. A coiler head as claimed in claim 1 wherein said drive means comprises a ring gear member encircling and engaging said first member for driving the same in rotation about said first axis, third support means mounting said ring gear member on said second member for rotation relative thereto about said second axis, a shaft adapted to be connected to a motive means, and gear train means operatively connecting said shaft to said second member and to said ring gear member to drive the same in rotation about said second axis.

9. A coiler head as claimed in claim 8 wherein said third support means comprises:

third trackway means including a radially projecting bead portion carried by one of said ring gear and second members and defining an upper annular trackway concentric with said second axis and a plurality of circumferentially spaced peripherally grooved rollers carried by the other of said ring gear and second members and rotatively engaging said upper annular trackway bead portion.

10. A coiler head as claimed in claim 9 wherein said third trackway means is carried by said ring gear member and the rotatively engaged surface of one of said bead portions and said plurality of rollers is formed of low friction material.

11. A planetary coiler head adapted to package textile sliver in a stationary receptacle positioned therebeneath by depositing the sliver in a plurality of successive convolutions compacted into the receptacle and comprising:

a first member having an opening therein for the passage of sliver therethrough and a substantially planar lower surface,

means carried by said first member for advancing sliver through said sliver passage,

a second member encircling said first member and having a substantially planar lower surface,

first support means mounting said first member on said second member for rotation relative thereto about a first predetermined axis and with the lower surfaces thereof normally substantially aligned and comprising a plurality of spaced rollers and trackway means engageable therewith, said rollers being mounted from one of said first and second members and said trackway means being carried by the other of said first and second members,

said first member upon rotation thereof forming sliver advanced by said sliver advancing means into successive coils,

a third member encircling said second member,

second support means mounting said second member on said third member for rotation relative thereto about a second predetermined axis parallel to and spaced from said first axis and comprising a plurality of spaced rollers and trackway means engageable therewith, said rollers being mounted from one of said second and third members and said trackway means being carried by the other of said second and third members,

said second member upon rotation thereof precessing the location of the sliver coils formed by said first member, and

means for driving said first and second members in coordinated rotation about said first and second axes respectively to translate said sliver passage opening along a predetermined convoluted path of travel.

12. A planetary coiler head according to claim 11, wherein said plurality of spaced rollers of said first and second support means are peripherally grooved rollers, and wherein said trackway means of said first and second support means includes a radially projecting annular bead portion.

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