Oct. 29, 1968 J. R. WHITEHURST 3,407,446

STOP CONTROL FOR TEXTILE SLIVER COILER HEAD

Filed May 15, 1967 3 Sheets-Sheet 1

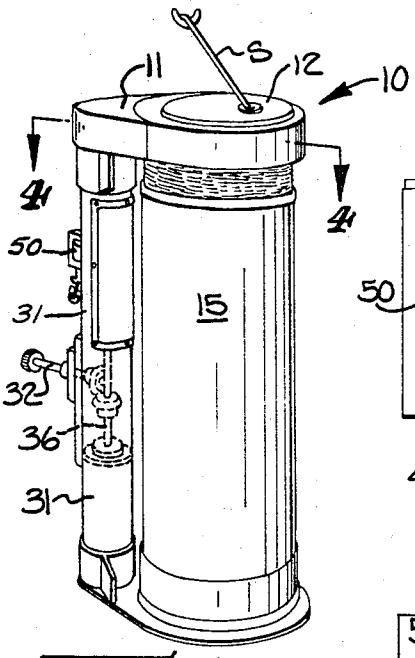

Fig-1

Fig-2

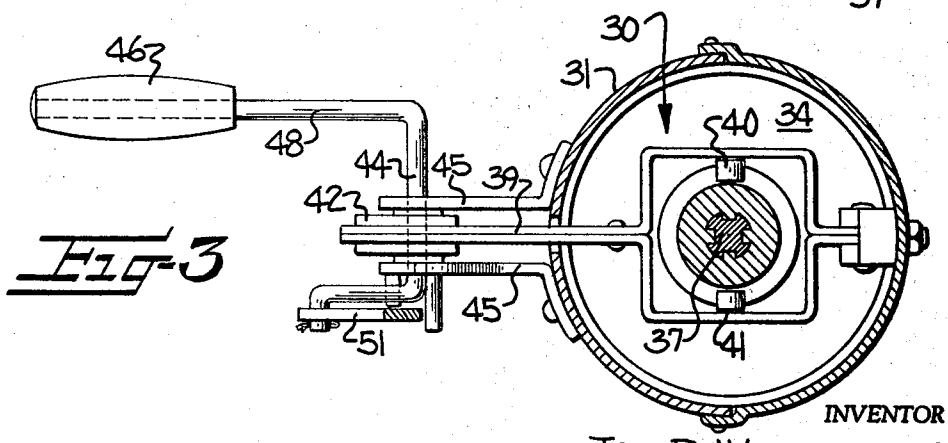

Fig-3

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Filed May 15, 1967 3 Sheets-Sheet 2

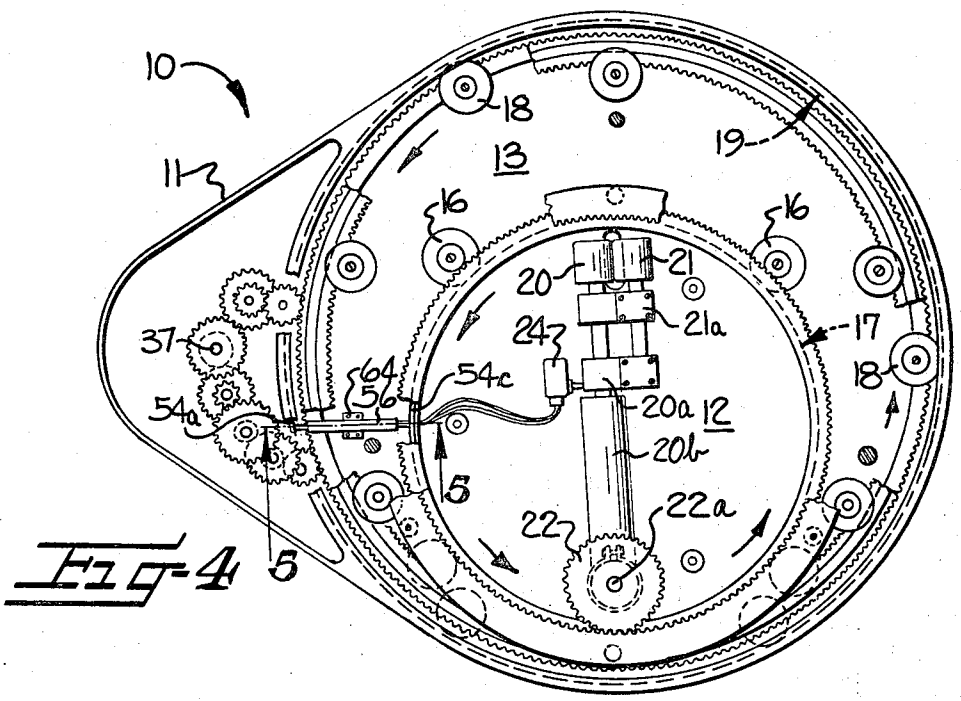

Fig-4

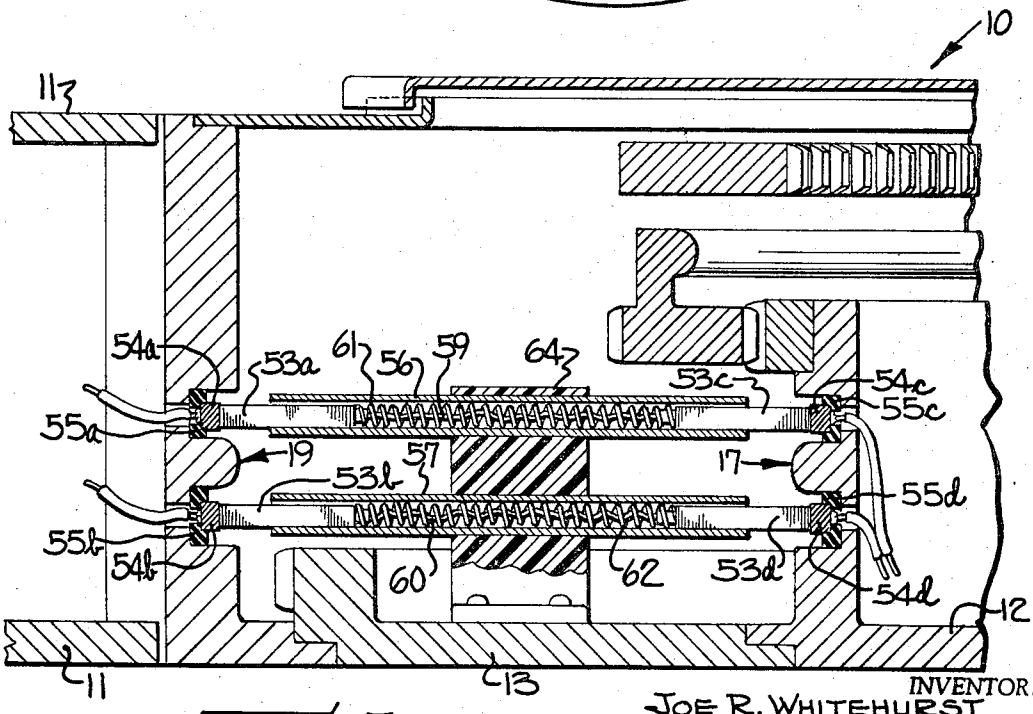

Fig-5

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STOP CONTROL FOR TEXTILE SLIVER COILER HEAD

Filed May 15, 1967 3 Sheets-Sheet 3

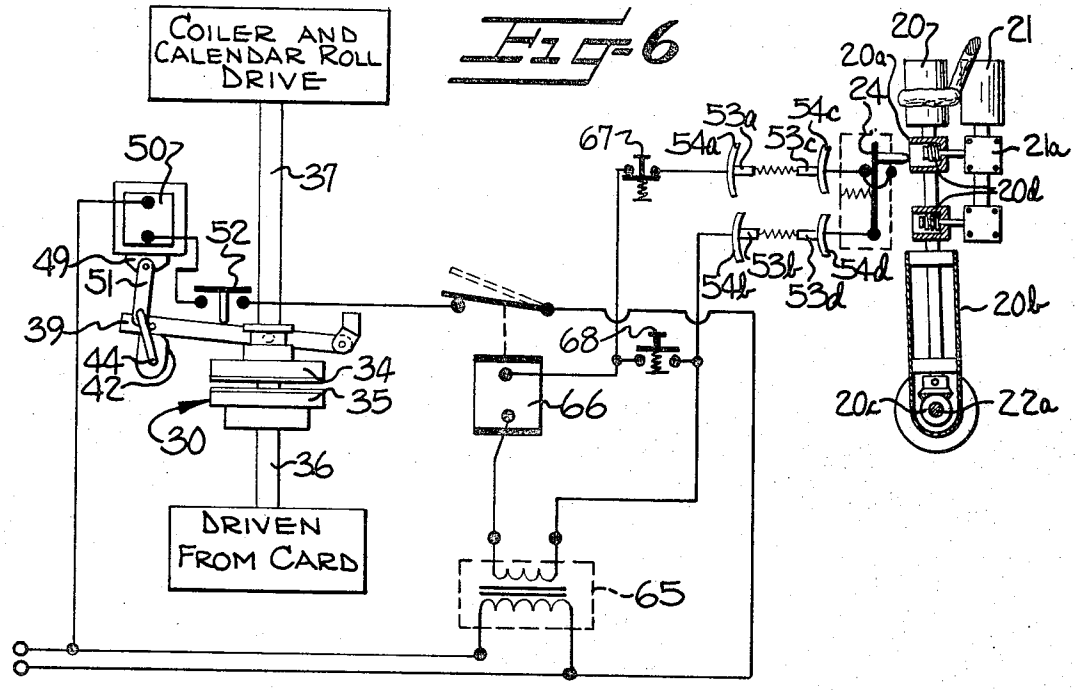

Fig-6

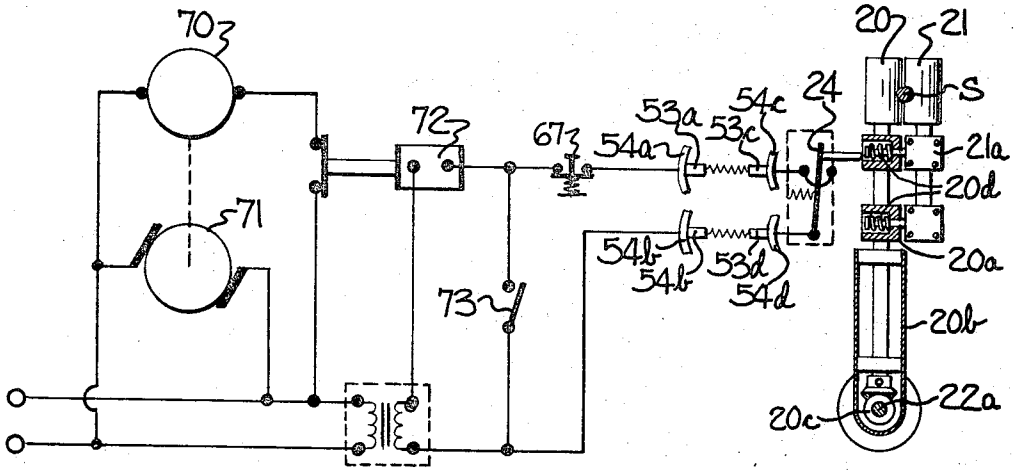

Fig-7

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STOP CONTROL FOR TEXTILE SLIVER COILER HEAD

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ABSTRACT OF THE DISCLOSURE

In a textile sliver coiler head of the type wherein a pair of cooperating sliver advancing calender rolls are mounted on and rotate with a coil forming member, means are provided for interrupting rotation of the calender rolls and the coil forming member upon certain predetermined conditions, in order to facilitate introduction of sliver to the calender rolls and to protect the coiler head against damage.

Included among the various known types of textile sliver coilers are certain types such as planetary and flat top coilers wherein a sliver advancing means, such as a pair of cooperating calender rolls, is mounted on a rotating member of a coiler head for rotation therewith. In a coiler of this specific type, the calender rolls and the member on which they are mounted cooperate by coordinated rotation to package textile sliver by formation of the sliver into coils in a manner similar to such coil formation by other types of coilers. As such textile sliver coilers have been recently gaining in favor with the textile industry, certain problems related thereto have become more apparent.

First, such coilers are equally subject, with those known before, to the occurrence of improper roll operating conditions such as a lap-up of the textile sliver about one of the calender rolls. Upon the occurrence of such a lap-up of textile sliver, forces are generated due to the wedging action of a compacted body of sliver which are capable of causing significant damage to the coiler head. However, the location of the calender rolls on a rotatable element of the coiler precludes the use of conventional choke plate stop motions or the like to protect the coiler against such damage.

Second, and uniquely as compared with other known coiler heads, initial introduction of textile sliver to the sliver advancing rolls of a coiler head of the specific type mentioned above, as in threading or piecing up the leading end of sliver produced by a cooperating textile machine for packaging by the coiler head, requires that an operator match the speed and direction of movement of the trumpet or passageway leading to the calender rolls, which may be moving with a rotational or compound rotational movement at a substantial speed. This operation makes threading or piecing up more time consuming and, where a coiler is operated at a significant linear speed of sliver advancing, may prove so difficult as to be quite frustrating to the operator.

In view of the aforementioned difficulties in the operation of textile sliver coiler heads of the specific type described, it is an object of the present invention to provide, in combination with such a coiler head, means for protecting against damage which otherwise might result from the continuance of an improper roll operating condition and for facilitating the introduction of sliver to the sliver advancing rolls of the coiler head. In accomplishing this object of this invention, a transmission means is interposed between the rotatable elements of the coiler head and a motive force means which drives those elements in rotation, for selectively interconnecting the same

and thereby controlling the rotation of the elements of the coiler head. The transmission means may be operated either in response to the occurrence of an improper roll operating condition, such as a lap-up of textile sliver thereabout, or upon a manual actuation, so as to permit an operator to stop rotation of the members of the coiler head and thereby facilitate threading up or piecing up a length of sliver.

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 coiler head including the present invention;

FIGURE 2 is an enlarged elevation view, partly broken away, of a portion of the coiler head of FIGURE 1;

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

FIGURE 4 is a plan view, in section, through the upper portion of the coiler head of FIGURE 1, taken substantially along the line 4—4;

FIGURE 5 is an enlarged elevation view, in section, of a portion of the coiler head of FIGURE 4;

FIGURE 6 is a partly schematic illustration of an electrical control circuit included in the coiler head of FIGURE 1; and.

FIGURE 7 is a partly schematic illustration of another electrical control circuit for a coiler head in accordance with the present invention.

Referring now more particularly to the drawings, a textile sliver coiler head is therein shown and identified generally at **10** (FIGURE 1). The specific textile sliver coiler **10** to which reference will be made in the course of describing the present invention is a planetary-type sliver coiler constructed as a card coiler for use in conjunction with a textile card or other independent sliver producing textile machine which includes a motive power means such as an electrical motor. However, it is to be understood at the outset that the combination described hereinafter has wide utility and may be applied to textile sliver coiler head configurations and applications other than that specifically illustrated. The textile sliver coiler head **10**, being of the planetary type, includes a stationary housing **11**, a coil forming member **12**, and a coil precessing member **13**. In order to describe the necessary path for the packaging of textile sliver such as the sliver S (FIGURE 1) into a container such as a sliver can **15**, the coil forming member **12** is supported for rotation relative to the coil precessing member **13**, as by a support means including a plurality of roller members **16** and a trackway means generally indicated at **17** (FIGURES 4 and 5). The coil precessing member **13** is similarly supported for rotation relative to the stationary housing **11**, by a support means including a plurality of rollers **18** and a trackway means **19** (FIGURES 4 and 5). A pair of cooperating sliver advancing calender rolls **20** and **21** are supported on the coil forming member **12** to overlie a sliver passage opening therein (FIGURE 4).

In order to form sliver S into packages in a suitable container such as the sliver can **15**, gear train means are provided for transmitting rotational motion to the coil forming member **12**, the coil precessing member **13**, and the pair of calender rolls **20** and **21** (FIGURE 4). The gear trains are designed to attain a particular predetermined and coordinated rotational movement for each of the various elements, one form being illustrated wherein the elements are driven in rotation as indicated by arrows, and may have various detailed configurations so long as the coil forming member **12** is revolved in coordination to the advance of sliver through the calender rolls

20 and 21 in such a manner that circles are described thereby about the center of rotation of that member. At the same time, the coil precessing member 13 revolves at a somewhat slower rate, to incrementally advance the center of rotation of the coil forming member 12, and thereby provide the spiral lay which is characteristic of packaged textile sliver. It should be noted, in this connection, that the details of the gear trains or other drive arrangements which assure proper coordination of the rotation of the elements of the coiler head 10 are not of primary concern with regard to the present invention, and may be varied as necessary or desirable in order to obtain proper operation of a coiler head. Reference is made to my copending application Ser. No. 566,870, filed July 21, 1966 and entitled Planetary Coiler Head which is now Patent No. 3,355,775, for a more detailed description of a coiler head of the type shown in the accompanying drawings.

In order to protect the coiler head 10 against damage such as would result from the continuance of an improper roll operating condition such as a lap-up of the sliver S about one of the calender rolls 20, 21, this invention provides that one of the rolls, preferably the roll 21, be fixed to coil forming member 12 so as to be secured on a single predetermined axis for rotation, while the other of the rolls, preferably the roll 20, be mounted for lateral movement relative thereto. Preferably, such mounting is accomplished by an arrangement which permits pivotal movement of the laterally movable calender roll 20 about a generally vertical axis, such as defined by the center of a calender roll driving gear 22 (FIGURES 4, 6 and 7). Upon such lateral movement of one of the calender rolls 20, an electrical sensing switch means in the form of a switch 24 is actuated thereby and the sensing switch 24 undergoes a change between conductive and non-conductive conditions in response to the occurrence of the improper roll operating condition. As will be brought out more fully hereinafter, this change in state of the switch 24 between conductive and non-conductive conditions is employed to interrupt rotation of at least the calender rolls 20 and 21, thereby stopping the rotation of the rolls, the advance of sliver thereby, and avoiding damage otherwise resulting therefrom.

As shown, the shaft of calender roll 20 is journaled in bearing members 20*a* and a casing 20*b*. Casing 20*b* is carried by coil forming member 12 for pivotal movement about the shaft 22*a* of gear 22. Shaft 22*a* is driven be gear 22 and other suitable gearing (FIGURE 4), and is drivingly connected to calender roll 20 by gears 20*c* (FIGURE 6). Spring means 20*d* in bearing members 20*a* normally urge roll 20 toward roll 21. Calender roll 21 is journaled in bearing members 21*a* secured to coil forming member 12.

In order to respond to a change in the switch 24 between conductive and non-conductive conditions, the combination of this invention provides means operatively electrically interconnected with the switch 24 for interrupting the transmittal of rotary motion to at least the calender rolls 20 and 21 from the motive power means such as the electrical motor driving the associated textile processing machine. As the coiler head 10 may take varying and different forms in detail, so may the means for responding to a change in condition of the switch 24 take varying and different configurations. For this reason, it is to be understood that the discussion which here follows is illustrative of only certain embodiments of such a means, and that other embodiments are comprehended by this invention. The means for interrupting the transmission of rotational motion of the elements of the coiler head 10 is preferably so constructed, as described more fully hereinafter, as to be responsive to a manual actuation, in order that an operator may manually stop rotation of the elements of the coiler head 10 for facilitating the threading up or piecing up of sliver through the coiler head 10.

As applied to the card coiler 10, the means for interrupting the transmission of rotational movement comprises a friction clutch device generally indicated at 30 and partially located within the column member 31 which supports the coiler head 10 (FIGURES 1, 2 and 3). The friction clutch device 30 is interposed between the gear trains driving the coil precessing member 13, the coil forming member 12, and thus the calender rolls 20 and 21, and a power input shaft 32 provided for connection with an associated textile material processing machine such as a carding engine. More particularly, the clutch device 30 includes a pair of cooperating friction face members 34 and 35, one of which is secured to a terminal extremity of a fixed power shaft 36 for rotation therewith and the other of which is mounted adjacent a terminal extremity of an intermediate shaft 37 for rotation therewith and longitudinal movement between engaged and disengaged positions. The upper member 34 is resiliently urged into the engaged position (downwardly in FIGURE 2) by a compression spring 33 and translational movement thereof longitudinally of the intermediate shaft 37, and thus engagement of the clutch means 30 for transmission of rotational motive force, is controlled by the movement of a yoke lever member 39. The lever member 39 is pivotally connected at one end thereof to the column 31 and extends around the clutch member 34 (FIGURES 2 and 3). A pair of projections 40 and 41 on the lever member 39 enter into a groove in the neck portion of the clutch member 34 to move the member longitudinally of the splined shaft 37 on pivotal movement of the lever member.

In order to permit actuation of the clutch device 30, the end of the lever member 39 remote from the pivotal connection thereof to the column 31 extends outwardly through an opening in the column and overlies a lifting cam 42 which is fixed to a turning link 44 for rotation therewith. The turning link 44, journaled in a pair of brackets 45 mounted on the column 31, includes a manually engageable handle 46 and a crank arm portion 48. The core 49 of a solenoid 50 is operatively connected to the crank arm 48 by a connecting link 51. The dimensions and configurations of the lifting cam 42, crank arm 48 and connecting link 51 are so coordinated to the stroke of the solenoid core 49 that, upon energization of the solenoid, the cam 42 is rotated to raise the lever 39 and disengage the clutch means 30. Upon raising the lever 39, a flat surface of the cam 42 is engaged with the lower surface of the lever 39, and the clutch means is thus blocked in the disengaged condition until the manual handle 46 is turned downwardly to re-engage the clutch. As is apparent, the handle 46 may be operated in such a manner that the clutch device 30 interrupts the transmission of rotation, without requiring energization of the solenoid 50.

In order to operatively electrically interconnect the solenoid 50 of the friction clutch device 30 with the switch 24 rotatable relative thereto with the sliver coil forming member 12, the combination of the present invention provides electrical conductor means defining at least one electrically conductive path from the stationary housing 11 to the switch 24 on the compound rotating coil forming member 12. More particularly, the means defining an electrically conductive path includes a plurality of commutator ring members and a corresponding plurality of brush members cooperating with the ring members to conduct electrical current between the relatively rotating coiler head elements.

A preferred arrangement for the brushes and rings provides for the mounting of a plurality of brushes 53*a*, 53*b*, 53*c*, and 53*d* on the coil precessing member 13 for rotation therewith, with each of the brushes engaging and electrically contacting a respective commutator ring member 54*a*, 54*b*, 54*c* and 54*d* mounted on one of the housing 11 and the coil forming member 12 (FIGURES 5 and 6) by respective channel members 55*a*, 55*b*, 55*c* and 55*d* of suitable electrically insulating material. Pairs of the brushes, namely the pair 53*a* and 53*c* and the pair 53*b*

and 53*d*, are mounted with brush tubes 56 and 57, electrically connected by appropriate conductors 59 and 60 extending therebetween, and baised outwardly into engagement with their respective commutator rings by compression springs 61 and 62 extending within the tubes 56 and 57. The entire brush structure is mounted on the coil precessing member 13 by a suitable standard 64.

In order to protect against the accumulation of textile fiber lint at the contacting surfaces of respective brushes and rings, such as the brush 53*a* and the ring 54*a*, the commutator rings 54*a*, 54*b*, 54*c* and 54*d* are positioned within grooves forming a portion of the trackway means 17 and 19 (FIGURE 5) so as to be shrouded by the adjacent material of the coil forming member and stationary housing, respectively. The ring members are insulated from the housing 11 and the coil forming member 12, and are electrically connected into circuit with the switch 24 and the solenoid 50 of the clutch device 30 by suitable conductor wires.

The operation of the above discussed embodiment of the combination of this invention is best discussed with reference to a schematic illustration of the complete electrical circuit (FIGURE 6). In order to provide electrical current for electrical actuation of the stop control of this invention while minimizing the likelihood of fires, a transformer 65 is provided, which has the primary winding thereof connected to a source of line voltage. The secondary winding of the transformer 65 provides a relatively low voltage, such as six volts, and is connected into a circuit including the winding of a control relay 66, the brushes and rings 53*a*–53*d* and 54*a*–54*d*, and the sensing switch 24. The armature and contacts of the control relay 66 are wired into a line voltage circuit including the coil of the clutch device solenoid 50.

In order to protect the coil of the solenoid 50 against a burn-out resulting from overlong energization, the line voltage circuit also includes a protective switch 52 positioned to overlie the lever member 39 and to be actuated thereby as the cam 42 reaches the blocking position wherein the lever member rests on a flat surface of the cam. Thus, current is removed from the coil of the solenoid 50 promptly upon the interruption of transmission of rotation by the clutch device 30 in response to energization of the solenoid. As is apparent, upward motion of the core 49 of the solenoid 50 upon energization thereof (which occurs as the sensing switch 24 is closed, control relay 66 changes state, and the line voltage circuit is completed) results in upward movement of the turn link 48 and handle 46 (FIGURE 2) and the clutch device 30 is actuated to an interrupted condition. Upon interruption of the transmittal of rotational motive force to the elements of the coiler head 10, rotation of the calender rolls 20 and 21 is stopped, by virtue of the stopping of the rotation of the coil forming member 12 and coil precessing member or coil laying member 13. Damage otherwise possibly occurring is thereby avoided.

Preferably, switch 24 is in the form of a double-throw switch, as shown, or may function in conjunction with another switch to effect energization of the clutch solenoid 50 upon contact of the calender rolls 20, 21 in the absence of a sliver therebetween, as well as upon excessive separation of the calender rolls such as may occur upon a lap-up of fibers around either or both rolls 20, 21. To facilitate piecing up of a parted sliver, a manual overriding switch 67 (FIGURE 6) may be conveniently located adjacent or on the coiler head and interposed in the circuit between the switch 24 and the relay 66. The switch 67 may be held open manually to prevent unintentional energization of the solenoid 50 by interengagement of the calender rolls 20, 21 while the operator is inserting the sliver between the rolls 20, 21 during rotation thereof. Thereafter, the switch 67 may be released to condition the circuit for normal operation in the manner described heretofore.

If desired, a normally open manual stop switch 68 may be closed momentarily to energize solenoid 50, in the manner of sensing switch 24, instead of manually actuating the handle 46 to separate clutch members 34, 35 and interrupt manually the delivery of rotational motive force to the rotating elements of the coiler head 10.

In another embodiment of the present invention, the combination may be constructed employing a clutch device which is purely electrical in nature, rather than an electromechanical clutch such as the solenoid operated friction clutch device 30 described hereinabove. More particularly, an electromagnetic particle clutch 70 (FIGURE 7) may be incorporated between a motive force means such as an electrical motor 71 and a coiler head driven therefrom (not shown). Where an electromagnetic particle clutch is employed, the transmission of rotational motive force therethrough is directly affected by the absence or presence of electrical energization applied to the clutch to coalesce a body of magnetic particles, and thus a relay 72 may be employed in a circuit position similar to the control relay 66 described above with reference to the schematic circuit diagram of FIGURE 6. Where a purely electrical clutch device is employed, a manually actuable means for interrupting the transmission of rotational motive force must of necessity be a switch such as the switch 73 (FIGURE 7). Switch 73 may be closed manually to energize the clutch 70, but should occupy open position during normal operation so the clutch 70 then is controlled by the sensing switch 24.

The elements shown to the right of manual switch 73 in FIGURE 7 may be identical to those shown in the right-hand upper portion of FIGURE 6 and, therefore, will bear the same reference characters to avoid repetitive description.

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 the claims.

I claim:

1. In a textile sliver coiler head including a stationary housing, a sliver coil forming member rotatably supported in the housing, and a pair of cooperating sliver advancing calender rolls mounted on the coil forming member for rotation therewith and wherein a motive force means is provided for rotating the coil forming member and rotating the calender rolls for forming packages of textile sliver, the combination therewith of means for protecting the coiler head against damage otherwise resulting from the continuance of an improper calender roll operating condition such as a lap-up of textile sliver thereabout comprising:

electrical switch means mounted on the coil forming member for rotation therewith and operable between conductive and non-conductive conditions in response to the occurrence of an improper calender roll operating condition such as a lap-up of textile sliver thereabout, and

means operable in response to operation of said switch means upon the occurrence of an improper calender roll operating condition for interrupting rotation of the calender rolls by the motive force means and thus stopping the rolls.

2. The combination according to claim 1 wherein said responsive means comprises electrically controllable transmission means interposed between the coiler head and the motive force means for selectively interconnecting the same and wherein the combination further comprises electrical conductor means electrically interconnecting said transmission means and said switch means into a circuit for selective transmission of rotational movement to the coil forming member and the calender rolls by said transmission means in response to a change between conduc-

tive and non-conductive conditions of said switch means.

3. The combination according to claim 2 wherein the coiler head is of the planetary type and further includes a coil laying member rotatably supported in the housing and encircling and supporting the coil forming member and wherein the motive force means also rotates the coil laying member to precess the coil forming member and wherein the combination further comprises a manually actuable means operatively interconnected with said transmission means and manually operable for controlling said transmission means to interrupt rotation of the coil laying and coil forming members.

4. In a planetary textile sliver coiler head including a stationary housing, a sliver coil laying member rotatably supported in the housing, a sliver coil forming member encircled by and rotatably supported in the coil laying member, and a pair of cooperating sliver advancing calender rolls mounted on the coil forming member for rotation therewith and wherein a motive force means is provided for rotating the coil laying member, the coil forming member and the calender rolls for forming packages of textile sliver, the combination therewith of means for facilitating the introduction of sliver to the calender rolls comprising transmission means operatively connected to and interposed between the coiler head and the motive force means and operable in response to a manual actuation to interrupt rotation of the coil laying and forming members, said transmission means being electrically controllable for interrupting rotation of the coil laying and forming members, and electrical switch means mounted on the coil forming member for rotation therewith and operable between conductive and non-conductive conditions in response to improper roll operating conditions such as a lap-up of sliver thereabout and electrical conductor means electrically interconnecting said transmission means and said switch means.

5. The combination according to claim 4 wherein said electrical conductor means comprises a plurality of brushes and commutator rings mounted on said relatively rotating coil laying and forming members and housing for conducting electrical current between the precessionally rotating coil forming member and the stationary housing.

6. The combination according to claim 5 wherein said brushes are mounted on the coil laying member for rotation therewith relative to the housing and each of said brushes electrically contacts a corresponding ring mounted on one of the housing and coil forming members and wherein at least two of said brushes respectively contacting a ring mounted on the coil laying member and a ring mounted on the housing are electrically connected for forming with the rings an electrically conductive path.

7. The combination according to claim 4 wherein said transmission means comprises a friction clutch device including a clutch member movable between engaged and disengaged positions, electrical solenoid means operatively connected to said clutch member for moving the same between said positions and a mechanical linkage having a manually actuable member operatively connected to said clutch member for moving the same between said positions.

8. The combination according to claim 7 wherein said mechanical linkage includes a blocking cam member for releasably restraining said clutch member in the disengaged position.

9. The combination according to claim 4 wherein one roll of the pair of sliver advancing calender rolls is mounted on the coil forming member for lateral movement relative to the other roll of the pair upon the occurrence of an improper operating condition, the other roll is secured to the coil forming member and restrained against lateral movement relative thereto and wherein said switch means is positioned adjacent the one roll for actuation in response to movement thereof relative to the other roll.

10. In a textile sliver coiler head including a stationary housing, a sliver coil laying member, a sliver coil forming member encircled by the coil laying member, a pair of cooperating sliver advancing calender rolls mounted on the coil forming member for rotation therewith, and first and second support means for supporting the coil forming member from the coil laying member for rotation relative thereto and both members from the housing for rotation relative thereto, and wherein each of the support means comprises a trackway means including a groove carried by one of an adjacent pair of said relatively rotatable members and housing, and rollers carried by the other of the pair for engagement with said trackway means, and wherein a motive force means is provided for rotating the coil laying member, the coil forming member and the calender rolls for forming packages of textile sliver, the combination therewith of means for protecting the coiler head against damage otherwise resulting from the continuance of an improper roll operating condition and for facilitating the introduction of sliver to the calender rolls comprising:

electrical switch means mounted on the coil forming member for rotation therewith and operable between conductive and non-conductive conditions in response to the occurrence of an improper roll operating condition such as lap-up of textile sliver thereabout;

manually actuable electrical switch means operable between conductive and non-conductive conditions in response to a manual operation,

electrical circuit means electrically connected to both of said switch means and including a plurality of commutator rings shroudingly mounted in the grooves of the support means and insulated from the coil forming and laying members and the housing and a plurality of brushes electrically contacting said commutator rings for forming therewith an electrically conductive path, and

means electrically interconnected with said circuit means and operable in response to a change in either of said switch means between conductive and non-conductive conditions for interrupting rotation of the coil forming and laying members and the calender rolls by the motive force means and thus stopping rotation of the members and the rolls.

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