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J. G. KERSHAW ET AL

2,656,573

CONDENSING SILVER

Filed June 2, 1951

2 Sheets-Sheet 1

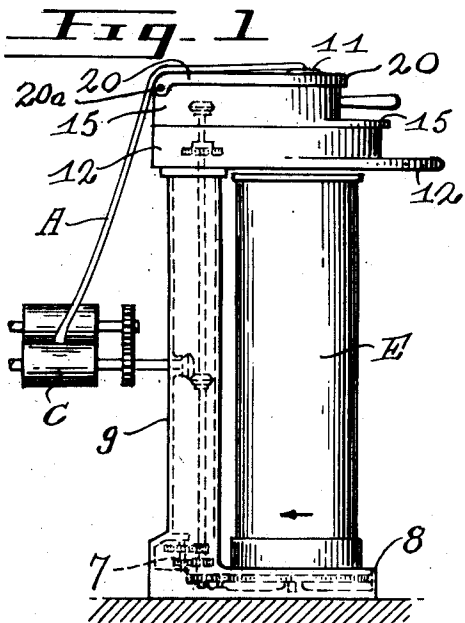


Fig. 2

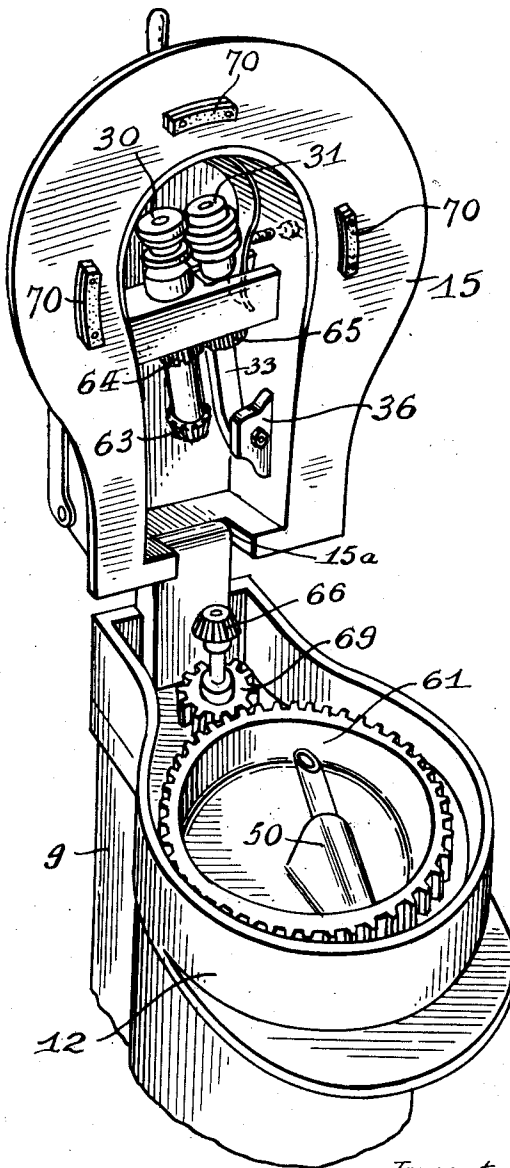


Fig. 3

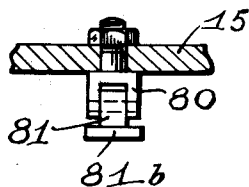
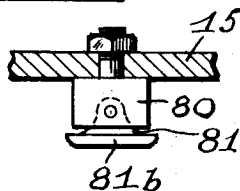


Fig. 4



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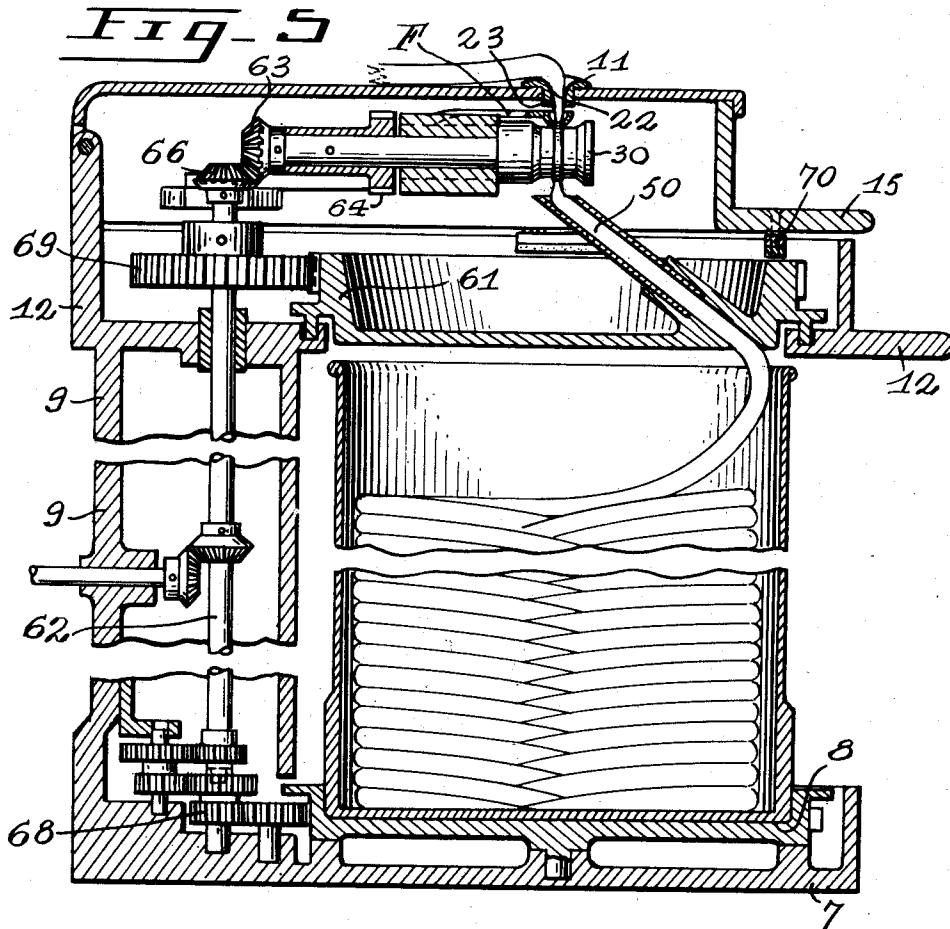
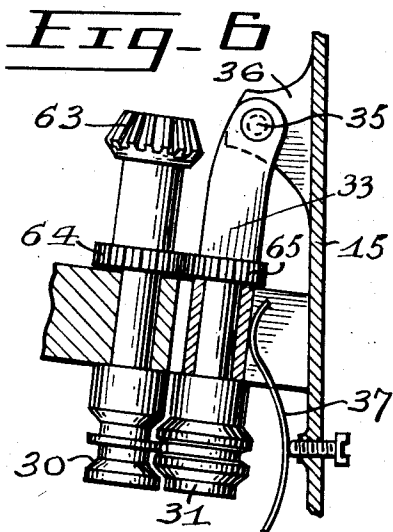
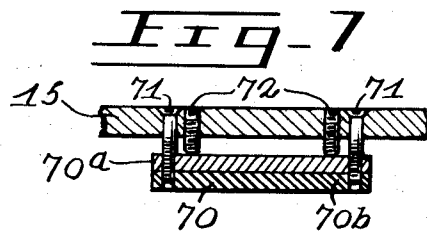
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UNITED STATES PATENT OFFICE

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CONDENSING SLIVER

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4 Claims. (Cl. 19—159)

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This invention relates to condensing sliver and coiling it into a can.

In textile manufacture, at various stages of producing yarn, sliver is condensed and put into a can in which it is taken to the location of the next operation. After carding, this condensation is usually effected by calendars or press rolls attached to the card and further in a coiler head by which the sliver is inserted into the can. Several slivers coming from the condensing operation after carding are passed through a drawing frame and drafted to form one, condensed further and again put into a can. In each of these condensing operations it is desirable to place as much sliver as possible in the can.

Various types of apparatus have been employed in an endeavour to place large amounts of sliver into a can. However, most of these apparatus have employed attachments to existing equipment and require modification.

The applicants' development

The applicants have now developed expedients which require only minor modification of existing apparatus and which may conveniently be used in conjunction with the method and apparatus disclosed in United States Patent 2,385,448. This device is for condensing sliver from the form in which it is received from the large calendar to a more condensed form. The present invention relates to the placing of the condensed sliver into the can by means of a coiler constructed in accordance with the invention.

The coiler includes the conventional features, including the coiler head having a bottom part, a middle part pivoted to the bottom part, and an upper part pivoted to the middle part. The bottom part has an annular horizontal portion adapted to be positioned directly above the can into which the condensing sliver is to be coiled. The device includes a toothed tube gear having an annular portion normally bearing in sliding relationship on the annular portion of the coiler head bottom part. The tube gear is thus supported on the bottom part for rotation in contact with it, and is adapted for limited upward movement by pressure from the coiled sliver in the can beneath. The tube gear also has an upper peripheral margin which is used in accordance with the invention as will be described.

In accordance with the invention, a plurality of bearing members are attached to the under side of the coiler head middle part in a position above the peripheral margin of the tube gear. The coiler head middle part, bottom part, and

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tube gear are so related that the middle part is supported by the bottom part with the bearing members normally placed, in accordance with the invention, a predetermined distance from the tube gear. The bearing members are adapted to contact the tube gear in sliding relation when the tube gear is moved upwards by sliver building up in the can.

When the tube gear contacts the bearing member it can lift further only by lifting the entire weight of the coiler head middle part and upper part. So, the sliver builds up until such a time as it exerts sufficient pressure to lift the tube gear middle part and upper part. At the point where the tube gear and associated parts start to lift, the operators doffs the can and puts a new can in its place.

According to one form of the invention, the bearing members are adjustable in a vertical direction so that the normal clearance between the tube gear and bearing member can be adjusted.

In one construction, the bearing members each include a base portion of a durable material and a face portion attached to this base portion. The face portion is at least surfaced with a material having a low co-efficient of friction. A first screw means extends through the middle part of the coiler head to an adjustable threaded engagement with the bearing members. A second screw means extends through the coiler head middle part so as to contact the bearing members and limit their upward movement. Rotation of the first screw means is adapted to draw the bearing members towards or from the coiler head middle part relative to the tube gear. The second screw means is preferably positioned so as to contact the bearing members between the first screw means.

According to another variation of the construction, each bearing member includes a downwardly extending bracket connected to the coiler head middle part. A rubbing shoe is pivotally connected to the bracket and adapted to bear against the upper surface of the annular bearing portion of the tube gear when raised by the coiled sliver.

In the drawings

The invention will now be more fully described by reference to the preferred embodiment as illustrated in the accompanying drawings and in which:

Figure 1 is a diagrammatic general arrangement of a coiler apparatus in accordance with the invention.

Figure 2 is an enlarged perspective view of a coiler head, according to the invention, showing the middle and top parts in raised position.

Figure 3 is a fragmentary cross section partly in elevation of one form of pressure foot.

Figure 4 is a side elevation of the pressure foot shown in Figure 2.

Figure 5 is a vertical cross section through the coiler head shown in Figure 1.

Figure 6 is an enlarged detail view of a portion of the coiler head showing particularly the condenser rolls and their mounting.

Figure 7 is a fragmentary vertical cross section through another form of pressure foot in accordance with the invention.

Referring in more detail to Figure 1 of the drawings, the sliver indicated by A is shown passing between smooth calendar or press rolls C as it comes from the card and thence to the head of a coiler by which it is coiled and pressed into a can E.

The sliver is condensed to a certain extent as it is passed through a trumpet (not shown) between the doffer of the card and the calendars C, then it is taken up through a trumpet 11 on the coiler head whence it is passed between the coiled calendar rolls as will be explained and is then coiled into the can.

The coiler is made up of a foot 7 carrying a bottom plate 8 which supports the can, and a pillar 9 on which the head is mounted. The head comprises a bottom part 12 fixed to the pillar 9, a middle part 15 pivoted to the bottom part 12 as at 15a and a lid or top part 20 pivoted to the part 15 as at 20a. The cover 20 includes a trumpet 11 having a tapering mouth 22 through which the sliver is drawn and a depending funnel 23 by which the sliver is guided towards the condensing rolls.

The middle part 15 includes a framework in which are journaled the calendar rolls 30 and 31. 30 is a fixed roll, 31 is a movable roll being journaled in a supporting arm 33 pivotally mounted by a vertical pin 35 on a bracket 36 extending from the part 15, for inward movement with respect to the roll 30. A leaf spring 37 mounted on the part 15 serves to urge the roll 31 towards the roll 30. This construction is conventional for coiler heads.

The coiler mechanism is driven conventionally from a shaft 52 receiving its drive from the card. A bevel gear 53 in the head of this shaft meshes with a bevel gear 54 on the calendar roll 30. The roll 31 is provided with a gear 55 meshing with a gear 56 on the other roll 31. The bottom plate 8 is also driven from the shaft 52 by a train of gears indicated generally as 58. The drive of all these parts is synchronized so as to coil the sliver into the can in the desired manner.

The roll 31 is provided with a groove and the roll 30 with a tongue mating with the groove. The sliver passes through the groove into which it is pressed by the tongue and thus condensed.

In order to feed the sliver into the tongue and groove, a special condensing unit F is employed as described in U. S. Patent 2,385,448. This structure is adapted to prevent expansion of the sliver from the time of leaving the trumpet 11 until it is within the groove.

The sliver after passing through the rolls 30, 31, is taken up by the coiler tube 50 which is mounted for rotation on a tube wheel or gear 51 journaled in the bottom part 12 and suitably

driven from the vertical shaft 52 through a gear 59. This structure is conventional.

On the underside of the part 15 are mounted rubbing pads 70 adapted to engage the surfaces of the tube gear 51 under certain conditions to be described. These pads are made from or at least faced with material having a low coefficient of friction.

A preferred embodiment of this phase of the invention is best illustrated in detail in Figure 7. The rubbing pads 70 are made up of a steel base 70a and a lignum vitae bearing portion 70b. Screws 71 extend through the base of the middle part 15 and engage in threaded openings in the portion 70b. Adjusting screws 72 also extend through the base of the part 15 and are adapted to bear against the top of the base 70a.

Thus, the pads 70 can be raised or lowered with reference to the middle part 15 so that their clearance of the top of the gear 51 can be adjusted at will. This adjustment is accomplished by either tightening or loosening the screws 71 in conjunction with the screws 72 as will be clearly evident from the drawing. It is usually preferable to adjust the rubbing pads 70 so that they clear the top of the tube gear 51 by about .005 inch, but of course, this clearance can be set at will through the arrangement described.

According to another embodiment of the invention illustrated in Figures 3 and 4, instead of the rubbing pads 70 on the bottom of the part 15, a pair of downwardly extending brackets 80 are attached to the part 15. The brackets 80 are mounted in spaced apart relationship on the part 15 in approximately the same location as were the rubbing pads 70. Mounted on each of these brackets for pivotal movement is a downwardly extending shoe or depressor 81 adapted to bear under certain conditions to be described against the edge of the tube gear 51.

The pivotal connection between the depressor 81 and the bracket 80 is made centrally of the depressor 81 so that any upward movement of the tube gear 51 is transmitted directly to the bracket 80 and to the middle part 15. The pivotal mounting of the depressor 81 is to allow for limited pivotal movement so as to take care of any unevenness of the tube gear 51. This pivotal movement can only be limited as the depressor 81 is prevented from excess pivotal motion by a wide lower portion 81b which bears against the annular rim of the tube gear 51 when the gear is raised by the pressure of the sliver built up in the can.

The structural features above have been described in conjunction with a coiler head used to condense sliver immediately following carding. It will be understood, that this is only one application and that the condensing operation can also be performed elsewhere in treating the sliver, for instance, following the drawing frame or following the comb. The principle involved is the same and the apparatus quite similar.

The condensing process

The process of condensing in the apparatus described is as follows:

The sliver is initially threaded through the trumpet 11, through the condensing unit F and into the groove where it is engaged by the tongue and thus drawn through the coiler. Then the sliver proceeds continuously from the card and passes progressively between the calendar rolls C, then to the coiler head, through the trumpet 11

and through the special condensing unit F by which the sliver is virtually formed, during its passage therethrough, into a ribbon and thence into the groove in which it is pressed into very thin rectangular form by the working faces of the tongue and the groove. The rotation of the rolls C draws the sliver from the trumpet adjacent to the card, and the rotation of the rolls 30, 31, draws the sliver into the coiler head from the trumpet 14. This treatment is described in detail in U. S. Patent 2,385,448.

Coiling and laying into a can

After leaving the coiler head, the sliver is progressively laid into the can E by the rotating action of the tube 50 and the rotation of the can by the bottom plate 8 on the coiler foot. The condensed sliver coils pile up to the top of the can until their upward movement is limited by the bottom of the tube gear 61. For a time, depending on the weight on the coiler head, this results in forcing down the lower coils of sliver but when the upper pressure of the sliver becomes sufficient, it will raise the gear 61 until it contacts the pad 70 or alternatively, the depressor 81 so as to lift the coiler head. This is an indication that the can is full. When the optimum capacity of a particular size of can has been determined, a timing device can be arranged in conjunction with the coiling operation so that the latter is halted when the can has been filled to the desired degree.

In some types of coilers the weight on the head is sufficient to exert the requisite pressure on the sliver so as to fill the can to the desired degree. With other types of coilers, it is necessary to weight the head additionally.

Results

According to the process described, the sliver is condensed to a considerably greater extent than is the practice in the textile industry at the present time. Also, a considerably greater amount of sliver is laid into the can than is customary.

With sliver condensed according to the process described in U. S. Patent No. 2,385,448, it is possible to put about 14½ lbs. in a can about 11¾" in internal diameter by about 36" in depth and of normal capacity about 10½ lbs. without the sliver lifting the tube gear alone. The rubbing pads 70 in the coiler of the particular example described are set at about .005" ($\frac{5}{1000}$) clear of the upper peripheral margin of the tube gear. At about 14½ lbs. weight of sliver in the can, the upward pressure commences to lift the tube gear against the rubbing pads. The weight of the coiler top, in the neighborhood of 42 lbs. (the middle part 15 and the lid 20) thus reduces the tendency to lift until about 18½ lbs. sliver have been laid in the can.

It is good practice to doff cans before this point is reached, resulting in a well formed can containing, approximately 18 lbs. of American cotton, the equivalent amount of approximately 19 lbs. of Egyptian cotton, or equivalent amounts of other cotton. It is possible to creel this can behind the next machine in the process, without removing any of the sliver from the top because the can bottom plate is so set as to induce friction between the condensed sliver and the sides of the can.

This friction, which is caused by reason of the fact that the sliver has been forced into the can under pressure, reduces the upward surge of the coils of sliver when the can is doffed. The re-

sultant pressure of the can wall against the tightly coiled sliver retains the latter mainly within the can. There is not the tendency for the sliver to jump out that there would be if it were not properly coiled into the can and compressed. Thus the sliver is retained so that the can is ready to be used intact at the next operation.

The result of this process is the production of a can of sliver holding at least up to about 18 lbs. of American cotton or in other words, substantially the equivalent of a 50 grain sliver about 2520 yards in length by approximately ½" in diameter, where the can is about 11¾" in internal diameter by about 36" deep, or a proportionate amount for other sized cans. This is an advance over trade practice where about 10½ lbs. is substantially the normal content of a can, of the size indicated giving about 1470 yards in length of 50 grain sliver of a much greater than ½" diameter.

It would be possible to put more than 18 lbs. in a can of the size described by the present method, but more than 18 lbs. is not considered practical as it is desirable to keep the sliver length uniform, so as to eliminate piecings in subsequent operations.

Advantages

The great advantage of this method is that it makes available to the cotton manufacturer a can of sliver containing a uniformly large amount of American cotton which can be used in the next operation in its entirety. The next operation may be a drawing frame or, as in this case, a lap winder. This winder is fed by 16 card cans and will produce 16 laps of about 18 lbs. each. These laps will be creeled on a lap-back drawing frame which will produce approximately from each lap one drawing can containing 18 lbs. In this way all piecing up to the flier frame will be eliminated.

The quantity of sliver which it is possible to put into a can by this method is much greater than previously believed possible. The sliver has not the tendency to jump out of the can as might be expected. The resultant pressure of the can walls against the coiled and compressed sliver retain it in place within the top of the can so that it may be used intact at the next operation. The quality of this sliver is high since it is not injured in any way during treatment. The quality of the yarn resulting from the sliver made in this way is also high, as piecing is eliminated to a large degree.

This application is a continuation-in-part of application Serial No. 617,719½ filed September 21, 1945, now abandoned, which in turn was a continuation-in-part of application Serial No. 454,362, filed August 11, 1942, now Patent No. 2,385,448.

We claim:

1. An apparatus for laying sliver into a can, comprising in combination, a coiler including a head having a bottom part, a middle part pivoted to the bottom part, and an upper part pivoted to the middle part, the bottom part having an annular horizontal portion adapted to be positioned directly above a can into which the sliver is to be coiled, a tube gear having an annular portion normally bearing in sliding relationship on the annular portion of the bottom part whereby said tube gear is supported on said bottom part for rotation in contact therewith, said tube gear having an upper peripheral margin and being adapted for limited upward movement by pres-

sure from the coiled sliver in the can beneath, a plurality of bearing members on said middle part in a position above the peripheral margin of said tube gear; the middle part, bottom part, and tube gear being so related that the middle part is supported by the bottom part with said bearing members normally placed a predetermined distance from said tube gear, the bearing members being adapted to contact the tube gear in sliding relation on upward movement of the latter whereby the entire weight of the middle and upper part is brought to bear on the tube gear while leaving the tube gear free to rotate.

2. An apparatus, according to claim 1, wherein each bearing member is adjustable in a vertical direction whereby the normal clearance between the tube gear and bearing members can be adjusted.

3. An apparatus, according to claim 1, wherein each of said bearing members includes a base portion of a durable material, and a face portion attached to said base portion, said face portion being of a material with a surface having a low co-efficient of friction, a first screw means descending through said middle part and having a threaded engagement with said bearing member, second screw means extending through said middle part to contact and limit the upward

movement of said bearing member, the first screw means being adapted for drawing the bearing member towards or from the middle part, the second screw means being adapted to be positioned so as to limit the movement of said bearing member towards said middle part.

4. An apparatus, according to claim 1, wherein each bearing member includes a downwardly extending bracket connected to said middle part, and a shoe pivotally connected to said bracket and adapted to bear against the annular bearing portion of said tube gear.

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