April 7, 1953 H. C. BOLTON ET AL 2,633,693

TRAVERSE MECHANISM FOR RAYON SPINNING MACHINES

Filed Nov. 8, 1951 2 SHEETS--SHEET 1

FIG. 1

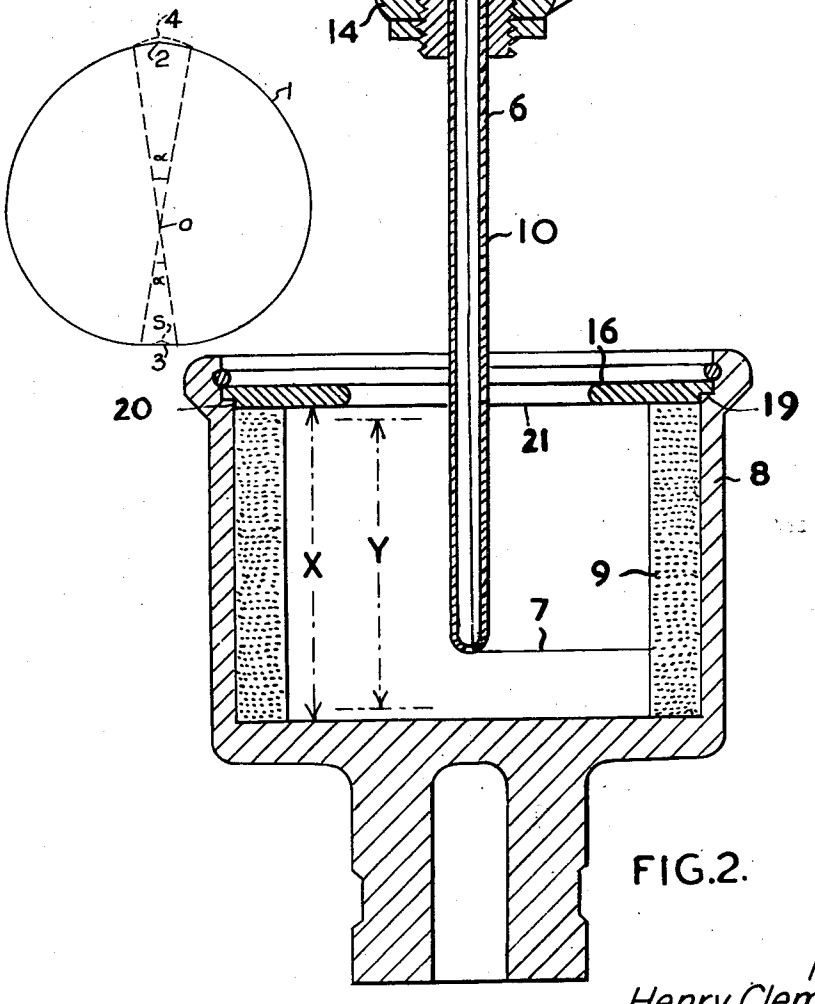

FIG. 2.

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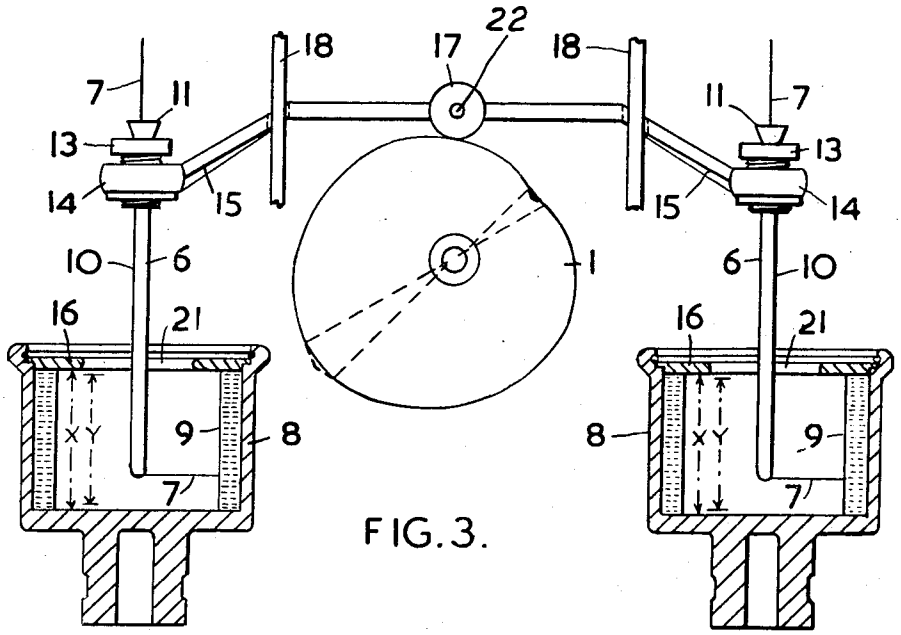

FIG. 3.

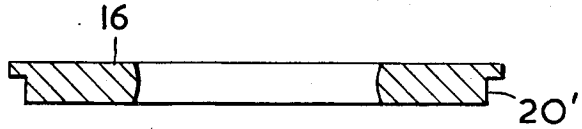

FIG. 4.

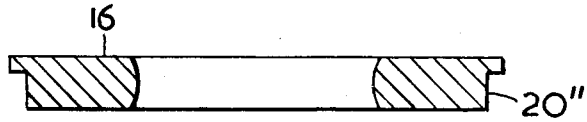

FIG. 5.

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2,633,693

TRAVERSE MECHANISM FOR RAYON SPINNING MACHINES

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In Great Britain October 31, 1947

2 Claims. (Cl. 57—76)

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This invention relates to a traverse mechanism for rayon spinning machines in which the thread guide feeding the extruded filaments to a rotating spinning box is traversed through the action of a follower on a cam. This application is a continuation in part application of our application Serial No. 54,626 filed October 15th, 1948, now abandoned.

In accordance with conventional practice the curve of the cam is a so-called "true cardiac curve" (in fact a portion of a spiral of Archimedes combined with its mirror image), rounded at the tip and root for some 3°. The true cardiac curve gives a steady traverse for the thread guide and the rounding over an angle of some 3° is not sufficient to interrupt in any material way the steady traversing action so that a cake with substantially cylindrical and parallel surfaces is obtained. In practice it is usual to make the height of the spinning box slightly greater than the stroke of the thread guide, for example, with a stroke of 4.49 inches the height of the box is normally 4.6 inches. In this specification the term "height of the box" means the distance from the bottom of the box to the under surface of the lid of the box and is substantially equal to the height of the cake collected in the box. With existing apparatus it has now been found that there is a maximum permissible speed at about 32 beats per minute and above this speed there is excessive vibration of the thread guides which results in faulty cakes. One cause is the fact that the acceleration given to the cam-follower at speeds above 32 beats per minute exceeds the acceleration due to gravity (g) at the tip and at the root of the cam. In standard pot spinning machines, two banks of funnels are reciprocated by two cams arranged at the ends of the banks; each cam has a follower, and the two followers are arranged on a traverse bar **22** (in Fig. 3 of this application). In practice one cam will wear more than the other, so that one cam follower will not in practice completely follow the contour of its cam, but will be influenced by the other follower to leave the surface of the cam and crashes back on to it after a short aerial path. The shock is transmitted to the traverse rail which thus vibrates with its own natural frequency.

It is the object of the present invention to provide traverse mechanism for a rayon spinning machine which will permit of higher speeds than heretofore.

According to the present invention a rayon centrifugal spinning machine comprising a spinning box, a thread guide for feeding filaments to the spinning box and a cam follower for traversing the thread guide axially of the spinning box is provided with the combination of a cam activating said cam follower, said cam being rounded off at the tip and the root over angles of at least 10° (preferably 15°) whereby the stroke of the guide has an appreciable dwell at each end and filaments are accumulated at the top and bottom of the box, and means for adjusting the height of the box with respect to the stroke of the cam so that the stroke of the guide is substantially shorter than the height of the spinning box in such degree that automatic spreading out of the accumulated filaments occurs and a cake having inside and outside surfaces substantially cylindrical and parallel is obtained. The cam is preferably a heart-shaped cam, but a cylindrical or shell cam may also be used.

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The effect of rounding off the tip and the root of the cam over at least 10° without simultaneous adjustment of the height of the spinning box relative to the stroke of the thread guide would be to produce a cake substantially thicker at the top and the base than at the centre with subsequent difficulties in washing and treating which would be shown in the quality, for example dyeing affinity, of the yarn taken from the various parts of the cake. It has been found, however, that by sufficiently increasing the height of the box relative to the stroke of the thread guide a cake having inside and outside surfaces which are substantially cylindrical and parallel can be obtained and hence a combination of this feature with the rounding off of the tip and root of the cam over at least 10° permits a substantial increase in the number of beats per minute without excessive vibration in the machine. For example, in an existing machine having a maximum permissible speed of about 32 beats per minute, the substitution of a cam rounded at the tip and the root over angles of 15° coupled with suitable adjustment of the height of the box relative to the stroke of the thread guide permitted speeds of the order of 48 beats per minute with satisfactory performance of the machine.

The adjustment of the height of the box relative to the stroke of the thread guide may conveniently be made by raising the bottom of the funnel (the normal thread guide employed) from the floor of the box to the required extent for example by holding the funnel in a ring held by a screwed bush which can be screwed upwardly or downwardly so that the bottom of the funnel is correspondingly moved upwardly or downwardly, and providing the box with a lid having a recess of substantially increased depth. Thus with a series of lids each with a different depth below the recess, provision may be made so that

different types of cakes can be collected with a single box. The difference between the height of the box and the stroke of the thread guide is preferably varied according to the denier of the thread being spun, the higher the denier the greater the difference. This difference may be ascertained by simple tests by varying the position of the bottom of the funnel and using lids of different thicknesses; the difference should be arranged equally at the top and the bottom of the stroke.

The invention is illustrated by way of example in the accompanying diagrammatic drawings in which

Figure 1 is a plan view of one form of cam suitable for use in the present invention,

Figure 2 is a vertical section of a funnel, a centrifugal spinning box and cover, the box height X compared with the dimension Y showing the adjustment of the height of the box according to the invention,

Figure 3 is a diagrammatic view on a reduced scale of a double-sided spinning machine in accordance with the invention comprising a rounded cam, a cam follower, a traverse bar and two funnels, and

Figures 4 and 5 show lids having recesses of different depths to give the necessary adjustment of the height of the box X.

Figure 1 shows a cam 1 which apart from the tip 2 and the root 3 is a true cardiac curve. The tip 2 and the root 3 are both rounded off over an angle α subtended at the centre 0 and is shown as about 15°. Chain lines 4 and 5 show the normal tip and root respectively of a true cardiac curve.

Referring to Figures 2 and 3, a reciprocating funnel 6 is used to lay a thread 7 into a spinning centrifugal box 8 to form a cake 9. The funnel 6 has a stem part 10 and a cone-shaped part 11 which rests on a metal ring 12 in the top of a bush 13. Bush 13 screws into a support 14 which is reciprocated by means of a bar 15 which, in accordance with standard practice, is secured to a follower 17 which runs in the groove of the cam 1. The follower 17 slides vertically on guides 18. Adjustment of the position of the funnel at the bottom of the stroke is obtained by screwing the bush 13 upwardly or downwardly as the case may be. The spinning box 8 is provided with a circumferential lip 19 and a lid 16 with a recess 20 of appreciable depth and a central hole 21 for passage of the funnel 6. In accordance with the present invention the height of the box (X) is made longer than the length (Y) of the traverse stroke of the funnel 6 so that the thread 7 when formed into the cake 9, automatically spreads out to form a cake having substantially cylindrical and parallel inside and outside surfaces. Other lids 16 having recesses 20' and 20'' of different thicknesses are illustrated in Figures 4 and 5.

The invention is illustrated by the following examples in which a cam having its tip and root rounded off over an angle of about 15° as shown in Figure 1 was used with a spinning box assembly as shown in Figures 2 and 3. Percentages are by weight.

Example 1

A viscose having a cellulose content of 7.5 per cent and a caustic soda content of 6.5 per cent and aged to a salt figure of 5.2 was extruded through a jet designed to form a 60 denier thread into a coagulant bath at 45° centigrade, containing 9.5 per cent of sulphuric acid, 20 per cent of sodium sulphate and 1 per cent of zinc sulphate. From the bath the thread was passed over a godet and was then collected in a centrifugal box at a speed of 100 metres per minute, corresponding to about 45 beats per minute. The height of the box, corresponding to X in the drawing, was 4.90 inches and the length of the traverse stroke, corresponding to Y was 4.49 inches. In order that cake should be uniform, the stroke of the funnel ended at a distance of .205 inch from the top and bottom of the box. A cake of substantially uniform thickness was obtained.

Example 2

Example 1 was repeated but in this case a jet designed to produce 75 denier thread was used, the height of the box was adjusted to 4.96 inches and the length of the traverse stroke was 4.49 inches. A cake of substantially uniform thickness was obtained.

Example 3

Example 1 was repeated but in this case a jet designed to produce 150 denier thread was used, the height of the box was adjusted to 5.02 inches and the length of the traverse stroke was 4.49 inches. A cake of substantially uniform thickness was obtained.

What we claim is:

1. In a rayon centrifugal spinning machine comprising a spinning box, a thread guide for feeding filaments to the spinning box and a cam follower for traversing the thread guide axially of the spinning box, the combination of a cam activating said cam follower, said cam having the shape of a true cardiac curve, except for the tip and the root, said cam being rounded off at the tip and root over angles of about 10° to about 15°, whereby the stroke of the guide has an appreciable dwell at each end and filaments are accumulated at the top and bottom of the box, and means for adjusting the height of the box with respect to the stroke of the cam so that the stroke of the guide is substantially shorter than the height of the spinning box in such degree that automatic spreading out of the accumulated filaments occurs and a cake having inside and outside surfaces substantially cylindrical and parallel is obtained.

2. In a rayon centrifugal spinning machine according to claim 1, the provision as the means for adjusting the height of the box with respect to the stroke of the thread guide, of a vertically adjustable support for the guide and a removable cover for the box each adapted to provide box space beyond an end of the stroke of the guide, thereby allowing for the automatic spreading of the accumulated filaments at the top and bottom of the box, whereby substantially cylindrical and parallel cake surfaces are obtained.

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LESLIE ROSE.

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