Oct. 27, 1970

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APPARATUS FOR CHANGING THE TWIST OF A YARN IN A SPINNING MACHINE

3,535,868

Filed Aug. 11, 1967

4 Sheets-Sheet 1

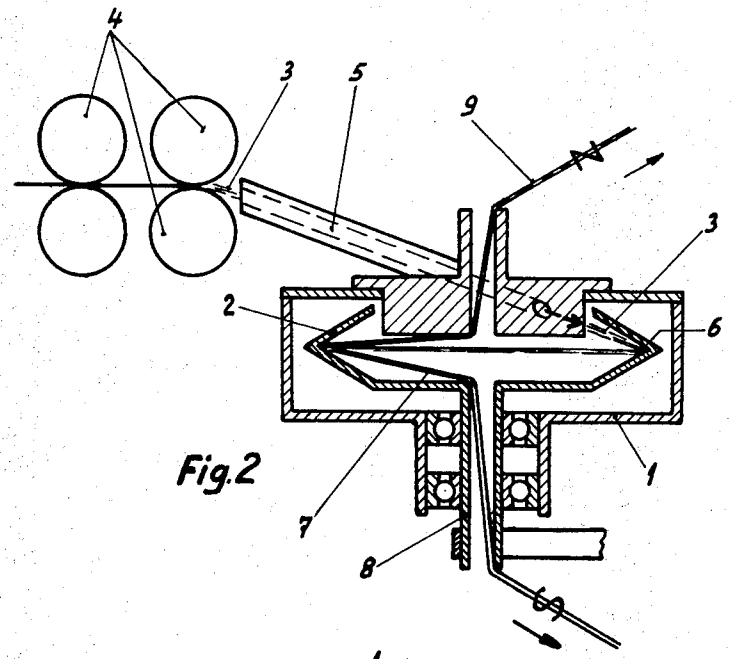

Fig. 2

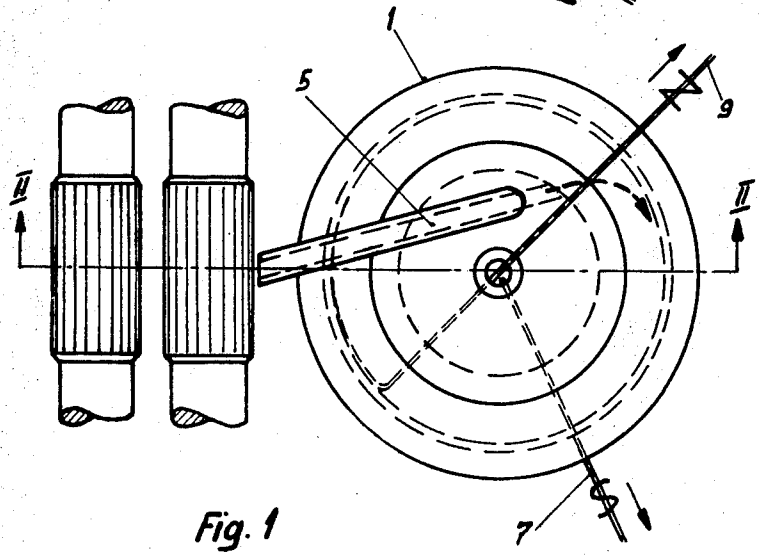

Fig. 1

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4 Sheets-Sheet 2

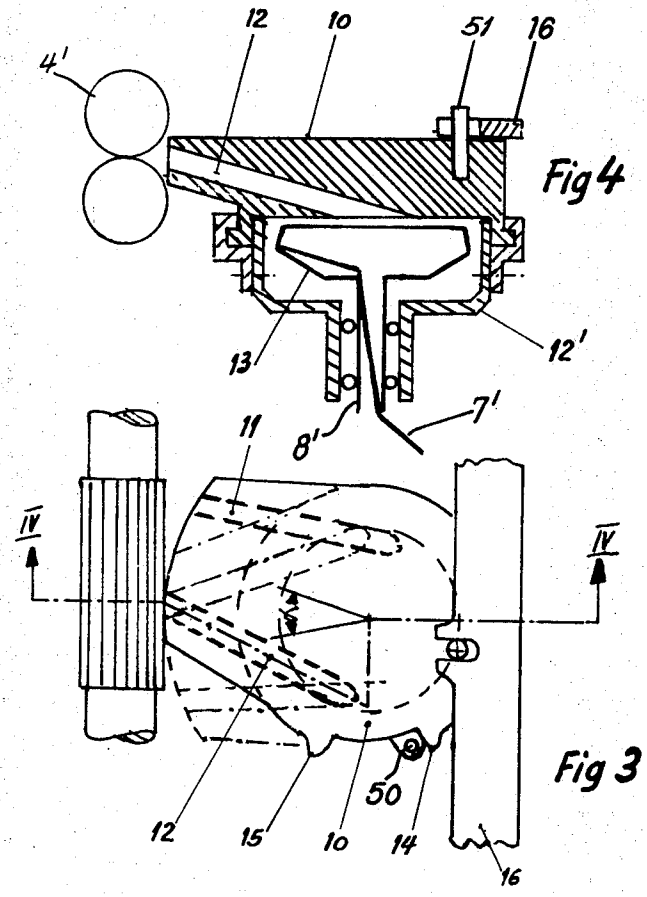

Fig 4

Fig 3

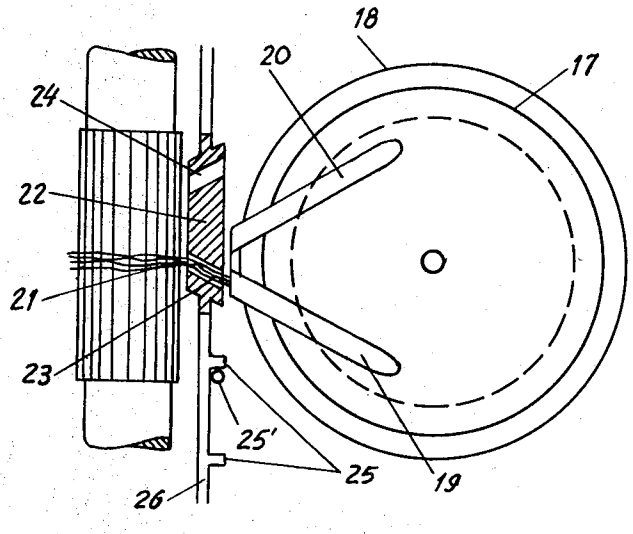

Fig 5

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4 Sheets-Sheet 3

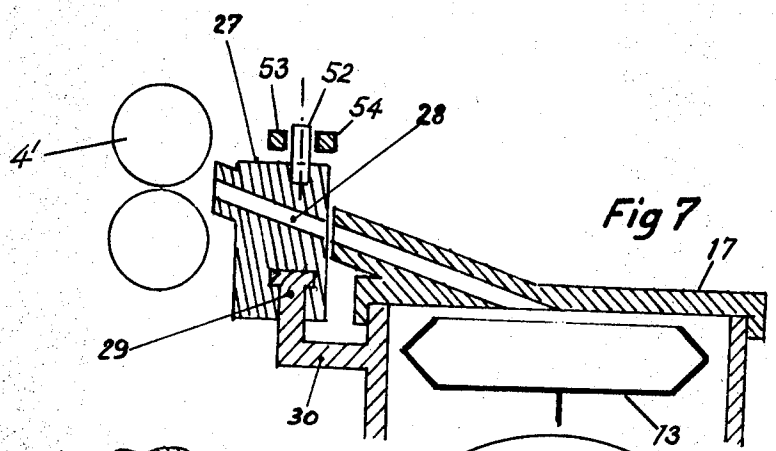

Fig 7

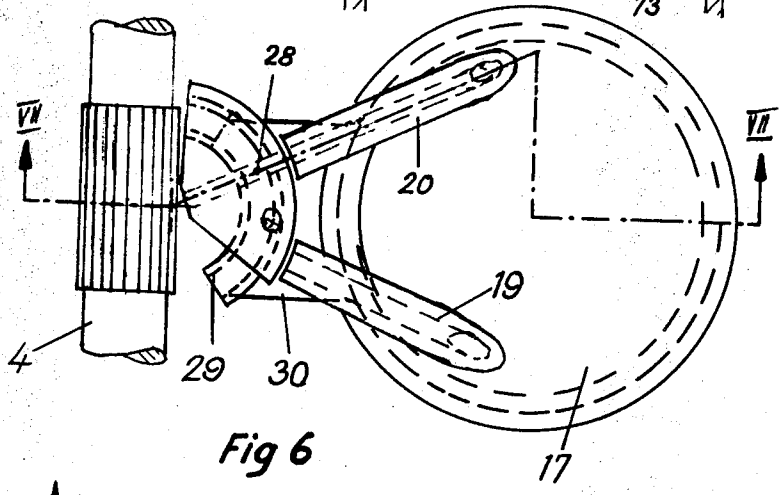

Fig 6

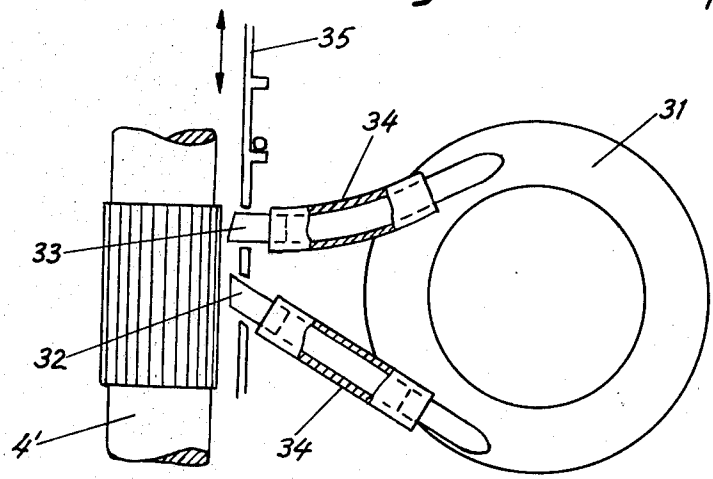

Fig 8

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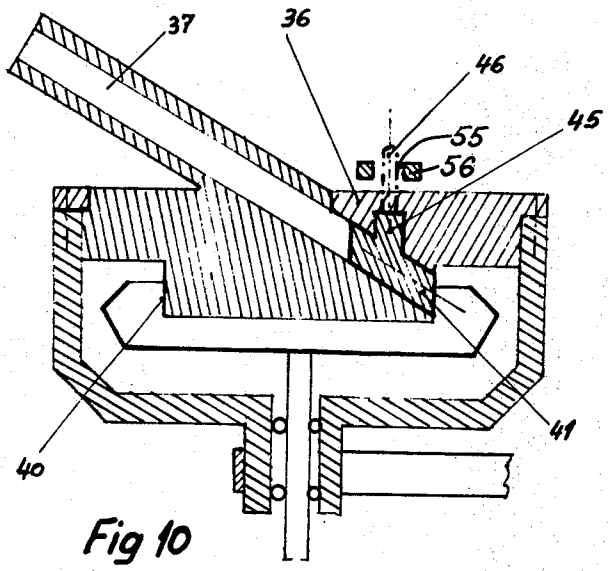

Fig 10

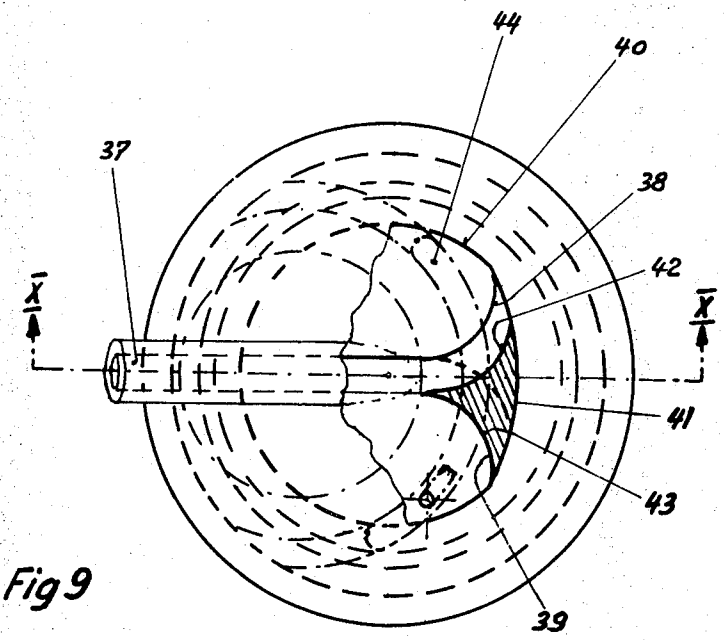

Fig 9

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APPARATUS FOR CHANGING THE TWIST OF A YARN IN A SPINNING MACHINE

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Int. Cl. D01h 1/12
U.S. Cl. 57—58.95 12 Claims

ABSTRACT OF THE DISCLOSURE

The feed channel is positioned above the spinning cell to direct the fibers tangentially into the fiber collecting area of the cell in either of two opposite directions. The spinning cell is rotated in either of two opposite directions so that depending on the direction of rotation and the feed direction of the fibers which is selected in view of the direction of rotation the fibers can be twisted into a yarn having an S twist or a Z twist.

This invention relates to an apparatus for changing the twist of a yarn in a spinning machine. More particularly, this invention relates to an apparatus for spinning yarn of an S or a Z twist.

In feeding fibers to a rotating spinning cell of a spinning machine wherein the fibers are twisted into yarn, the setting of the direction of the fed fibers due to the left or right twist to be imparted is of great importance. should there be an incorrect feed, optimum yarn qualities cannot be obtained and, furthermore, the number of yarn breaks increase unduly. These disadvantages, however, cannot be tolerated in a spinning cell.

Up to the present, in order to change from a left twist to a right twist, the machine paths containing the feed channel for the fibers had to be changed. However, this has been time consuming and costly because of the necessary stock maintenance involved with such.

Accordingly, it is an object of the invention to twist fibers in either of an S-direction or Z-direction without changing machine paths.

It is another object of the invention to substantially obtain optimum yarn qualities in a yarn which is twisted in either of an S-direction or Z-direction on the same machine.

It is another object of the invention to reduce the number of yarn breaks in a twisted yarn.

Briefly, the present invention provides an apparatus which overcomes the above disadvantages in spinning fibers into yarn having an S or a Z twist. The apparatus includes a spinning cell which is rotatable in either of two opposite directions for twisting a yarn in either an S or a Z twist. In addition, the apparatus includes a feed means wherein the fibers are fed from an individual fiber supply source tangentially into a fiber collecting area of the spinning cell through one of two feed channels depending upon the direction of rotation of the spinning cell. The feed channels are mounted in an asymmetric relation over the spinning cell to cooperate with the fiber supply source. The selection of the feed channel for feeding the fibers to the spinning cell is determined by the direction of rotation of the spinning cell so that the desired yarn twist can be obtained without changing or replacing any parts of the apparatus.

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a cross-sectional view of a conventional rotatable spinning cell of a spinning machine;

FIG. 2 illustrates a view taken on line II—II of FIG. 1;

FIG. 3 illustrates a plan view of an apparatus of the invention;

FIG. 4 illustrates a view taken on line IV—IV of FIG. 3;

FIG. 5 illustrates a plan view of a modified apparatus of the invention;

FIG. 6 illustrates a plan view of another modified apparatus of the invention;

FIG. 7 illustrates a view taken on line VII—VII of FIG. 6;

FIG. 8 illustrates a plan view of another embodiment of the invention;

FIG. 9 illustrates a fragmentary plan view of still another embodiment of the invention; and

FIG. 10 illustrates a view taken on line X—X of FIG. 9.

Referring to FIGS. 1 and 2, wherein a conventional fiber twisting apparatus is shown for purposes of illustrating the disadvantages of the prior art, a spinning cell 2 is rotatably mounted within a casing 1 as by means of a ball bearing assembly and driven through a belt. The fiber material 3 in the form of fibers is supplied from a drawing mechanism 4 and fed through a feed tube 5 tangentially into the spinning cell 2 during rotation of the cell 2. A peripheral fiber 6 is formed in the spinning cell which, after being twisted, is pulled centrally through an exchange tube 8 in the form of a yarn 7. Where the spinning cell 2 is rotated clockwise as viewed, an S twist yarn is produced. Where a Z twist yarn is to be produced without changing the direction of rotation of the spinning cell 2, the yarn 9 is pulled axially through the opposite side of the cell 2; i.e., to the right as shown in dashed lines in FIG. 2. This, however, requires a change in the direction of the yarn course and is therefore constructionlly as well as operationally to be avoided.

Accordingly, it would be advisable to change the direction of rotation of the spinning cell without changing the direction of the yarn course. However, this requires the feed channel to conform with the prevailing direction of rotation of the spinning cell because the fibers should be fed in the same rotational direction as well as tangentially in order to obtain the highest yarn qualities.

Referring to FIGS. 3 and 4, the apparatus of the invention includes a lid 10 which is pivotally mounted in slidable relation on casing 12' over a spinning cell 13 similar to that described above. The lid 10 has a pair of feed channels 11, 12 which are arranged tangentially of the spinning cell 13 so as to feed the fibers into the cell 13. The channels 11, 12 are also disposed in operative relation to the drawing mechanism 4' so as to selectively receive the fibers passing from the drawing mechanism 4'. The left channel 12 is shown in a feed position adjacent to the drawing mechanism 4' to receive the fibers while the right channel 11 is shown in a rest position so as not to receive the fibers. In addition, the lid 10 has a pair of arcuately spaced integral stops 14, 15 which project outwardly of the lid 10 to abut a suitable stop bar 50 mounted on the casing 12' in the projected path of the stops. Also, the lid 10 has a pin 51 secured in the top surface radially outwardly from the the lid axis which slidably mates in a slot in a reciprocally mounted bar 16 above the lid 10.

In order to twist the fibers from one direction to an opposite direction while the yarn 7' is drawn off from the same exchange tube 8', the direction of rotation of the spinning cell 13 is reversed in a conventional manner, for example, through a suitable belt and drive mechanism (not shown). Also, the lid 10 is pivoted about its axis by means of a longitudinal movement of the bar 16 through

an angle α on casing 12' from one of the stops 14, 15 to the other. For example, in FIG. 3, the lid 10 is pivoted in a counterclockwise direction so that the right feed channel 11 assumes a position adjacent to the drawing mechanism 4' as indicated by the dot and dash lines. The right feed channel 11 is then in position to receive and convey the fibers into the spinning cell 13 in tangetial relation. Thus, it is only necessary to pivotally adjust the lid 10 a limited angle in relation to a reversal in the direction of rotation of the spinning cell 13. The bar 16 is connected to other suceeding spinning stations provided with lids 10 along the spinning machine in a similar manner so as to actuate all the spinning stations at the same time.

Referring to FIG. 5, with a similar structure as above, a modified lid 17 is positioned in fixed relation above a casing 18 for the spinning cell (not shown). The lid 17 includes a left feed channel 19 and a right feed channel 20, each of which is tangentially disposed in relation to the spinning cell in casing 18 and held in fixed relation to the fiber supply station 21. In addition, an adapter 22 is interposed between the feed channels 19, 20 and drawing mechanism in shiftable relation to the feed channels 19, 20. The adapter 22 has a spaced pair of short channels 23, 24 disposed therein which are selectively positioned in alignment with a respective feed channel 19, 20. Also, the adapter 22 is mounted on a control bar 26, which extends along the spinning machine and which is provided with a pair of spaced limit stops 25 projecting into the plane of a stop 25'.

In order to change the twist direction of a yarn in this apparatus, the control bar 26 is moved longitudinally to move the adapter 22 at each spinning station as above so that the channel 24 becomes aligned with feed channel 20 at the fiber supply station 21. The fiber is then directed into feed channel 20 instead of feed channel 19. At the same time, the direction of rotation of the spinning cell (not shown) is reversed.

Referring to FIGS. 6 and 7, instead of mounting a reciprocal adapter between the lid 17 and drawing mechanism 4; an adapter 27 of segmental or crescent shade having a single short channel 28 is slidably mounted on an arcuate guide 29 secured with casing 30. The short channel 28 is positioned in the adapter 27 to be in alignment with either of the tangentially directed feed channels 19, 20 of the lid 17. In order to slide the adapter 27 along the guide 29, a pin 52 is secure in the top surface of the adapter 27 and passed into an enlarged slot 53 of a reciprocal bar 54 mounted above the guide 29. Upon longitudinal movement of the bar 54, the pin 52 is forced to move through a limited arcuate path so as to slide the adapter 27 along the guide 29. As above, movement of the short channel 28 from one feed channel to the other along with a reversal in the direction of rotation of the spinning cell 13 in the casing 30 causes a reversed change in the twist in the yarn produced.

Referring to FIG. 8, a stationary lid 31 is provided with a pair of feed channels which are tangentially disposed with respect to a spinning cell as above. However, in this modification, the feed channels 32, 33 each have an intermediate portion formed by a flexible sleeve 34 and a muzzle at the free end. The muzzles are both passed through slots of a reciprocal mounted track 35 so as to be displaced upon movement of the track 35 about the fiber supply station of the drawing mechanism 4'. The track 35 is provided with suitable limit stops, as above, to cooperate with a suitable stop, as above, so that a respective one of the feed channels 32, 33 is brought into position at the fiber supply station upon abutment of a limit stop with the stop.

Referring finally to FIGS. 9 and 10, a lid 36 having a single feed channel 37 is positioned over a spinning cell in fixed relation to the casing. The feed channel 37 is disposed obliquely in a downwardly inclined manner to the lid 36 and extends into a muzzle funnel having crescent shaped contact surfaces 38, 39. Each of the crescent shaped contact surfaces 38, 39 blends into the circular cylindrical surface 40 so that the transitional end portions are approximately tangential to the direction of rotation of the spinning cell. A movable deflector 41 is inserted within the funnel between the contact surfaces 38, 39 and is formed with lateral surfaces 42, 43 which are complementarily shaped to mate with the contact surfaces 38, 39 of the funnel in an alternative manner. In order to move the deflector 41 from abutment with one contact surface to the other contact surface, a guide slot 44 of circular arcuate contour is cut into the lid 36 above the deflector 41 and a connection piece 45 provided on the deflector 41 is slidably positioned in the guide slot 44. In addition, a bolt 46 is secured to the connection piece 45 to project above the lid 36 into the slot 55 of a stationary reciprocally mounted bar 56, similar to that described above. In operation, if a change in the direction of rotation of the spinnig cell takes place, the direction of rotation of the spinning cell is reversed and the bar 56 is shifted so as to displace the deflector 41 via bolt 46 from, for example, the solidly drawn position at the left of the centerline of the feed channel 37 as in FIG. 9 to the dotted line position at the right of the feed channel centerline. Thus, the fibers are fed into the spinning cell in an opposite direction.

What is claimed is:

1. An apparatus for spinning S and Z twist yarns comprising

a rotatable spinning cell having a fiber collecting area therein for twisting received fibers into yarn,

a feed means mounted over said spinning cell for asymmetrically feeding fibers into said fiber collecting area in a selective one of two opposite directions, and including selection means for selectively directing fibers from a common fiber supply source into one of said two opposite directions, and

means to rotate said spinning cell in opposite directions whereby a yarn can be twisted in an S direction or a Z direction.

2. An apparatus as set forth in claim 1 wherein said feed means includes a pair of feed channels mounted over said spinning cell in symmetric relation to the axis of rotation of said spinning cell and in asymmetric relation to said fiber collecting area and said selection means is disposed outside said feed channels to direct the fibers selectively into one of said feed channels.

3. An apparatus as set forth in claim 2 wherein said feed means includes a lid pivotally mounted over said spinning cell and each said feed channel is secured in said lid tangentially to said fiber collecting area.

4. An apparatus as set forth in claim 3 wherein said selection means includes a pin secured to said lid and projecting therefrom and a reciprocally mounted bar disposed above said lid and having a slot therein receiving said pin whereby upon longitudinal movement of said bar said pin is moved about the axis of said lid to pivot said lid to move one of said feed channels out of alignment with said common fiber supply source while moving the other of said feed channels into alignment with said common fiber supply source.

5. An apparatus as set forth in claim 2 wherein said feed means includes a lid and said feed channels have openings thereto disposed on opposite symmetric sides of said lid.

6. An apparatus as set forth in claim 5 wherein said lid is stationary with respect to the axis of said spinning cell and said selection means includes a movably mounted adapter between the fiber supply source and said feed channels for selectively passing fibers therethrough into one of said feed channels and means for moving said adapter between a pair of positions.

7. An apparatus as set forth in claim 6 wherein said adapter has a pair of spaced channels therein for the passage of fibers, said spaced channels being spaced a greater distance apart than the spacing between the

mouths of said feed channels whereby movement of said adapter to one of said positions aligns one of said spaced channels with the fiber supply source to permit feeding of fibers into one of said feed channels while a reciprocal movement of said adapter to the other of said positions aligns the other of said spaced channels with the fiber supply source to permit feeding of fibers into the other of said feed channels.

8. An apparatus as set forth in claim **6** wherein said adapter has a single channel therethrough for the passage of fibers and is pivotally mounted to selectively align said single channel with one of said feed channels.

9. An apparatus as set forth in claim **6** wherein said feed channels are flexible and said adapter has a pair of slots therein, each of said feed channels being received in a respective slot whereby movement of said adapter moves said flexible feed channels selectively into the path of fibers.

10. An apparatus as set forth in claim **1** wherein said feed means includes a single feed channel having a pair of opposite crescent shaped surfaces at one end thereof directed substantially tangentially into said fiber collecting area and said selection means includes a movably mounted deflector disposed between said pair of surfaces, said deflector having a pair of opposite lateral surfaces complementary to said crescent shaped surfaces and being positioned with one of said lateral surfaces in contact with an opposed one of said crescent shaped surfaces, and means for moving said deflector alternately between said crescent shaped surfaces to permit feeding of fibers into said fiber collecting area in opposite directions.

11. An apparatus as set forth in claim **1** wherein said feed means includes a lid over said spinning cell and at least one feed channel through said lid disposed obliquely to said spinning cell in a downwardly inclined direction.

12. An apparatus for spinning S and Z twist yarn comprising

a rotatable spinning cell having a fiber collecting area therein for twisting fibers into yarn,

means for rotating said fiber collecting area in opposite directions,

a fiber supply source outside said spinning cell for supplying fiber thereto,

a fiber feed means between said supply source and said collecting area for asymmetrically feeding fiber to said collecting area, and

means for selectively adjusting said fiber feed means in correspondence to the direction of rotation of said collecting area to feed fiber in selectively opposite directions into said collecting area.

References Cited

UNITED STATES PATENTS

3,121,306	2/1964	Cizek et al.	57—58.89
3,126,697	3/1964	Cizek et al.	57—58.89
3,132,465	5/1964	Putnam	57—58.89

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U.S. Cl. X.R.

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