

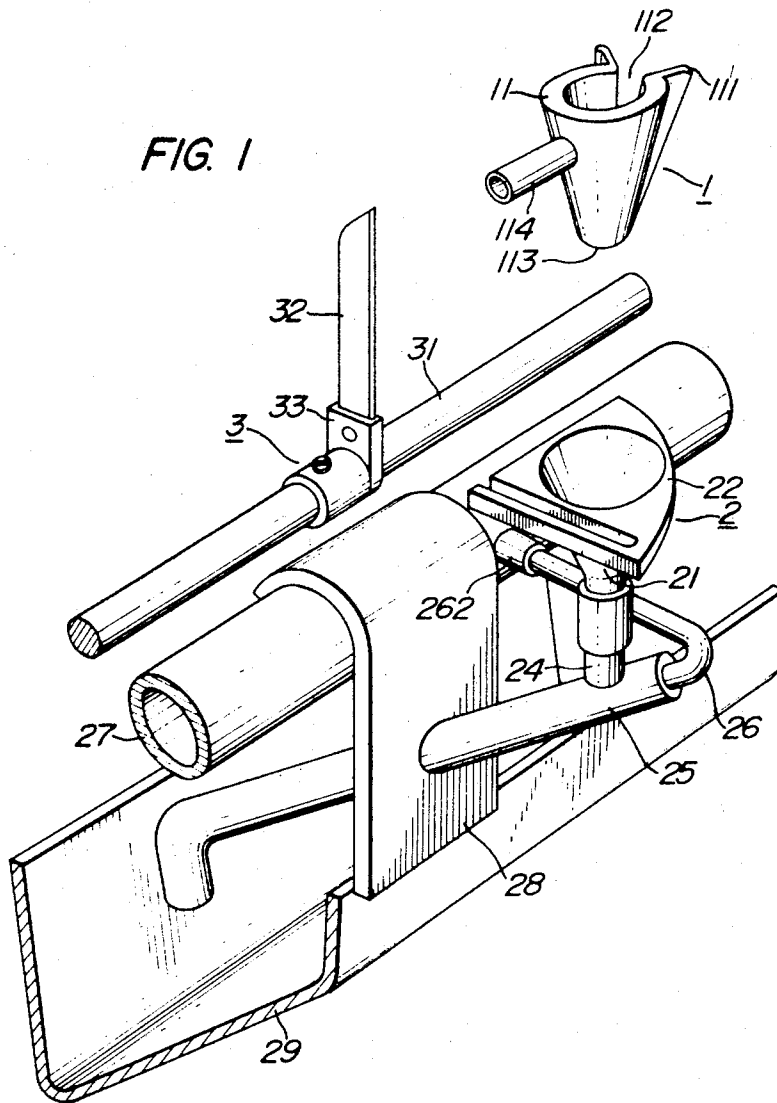
March 4, 1969

ATSUMI ASAMI ET AL  
APPARATUS FOR CUTTING A RUNNING YARN IN A CENTRIFUGAL  
TYPE SPINNING MACHINE

3,430,428

Filed May 8, 1967

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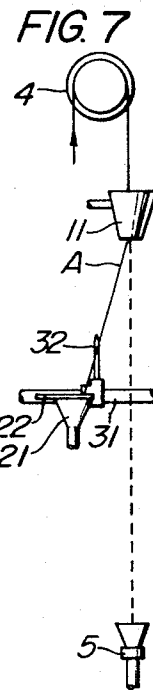
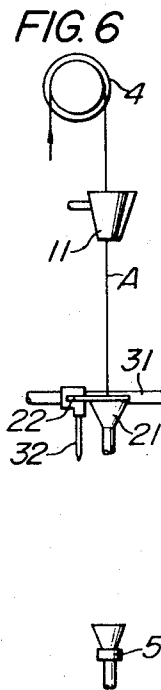
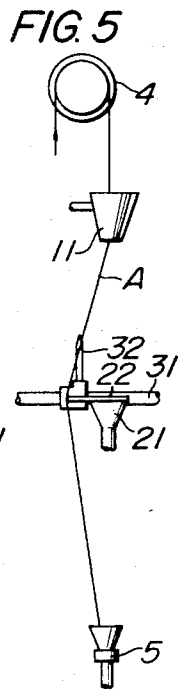
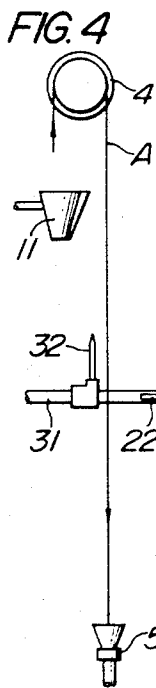
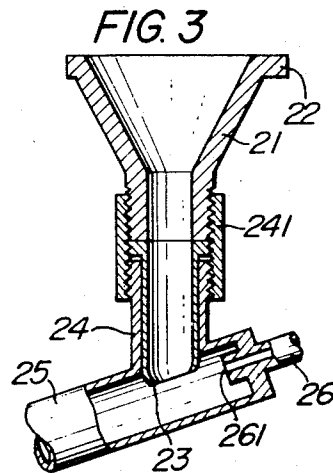
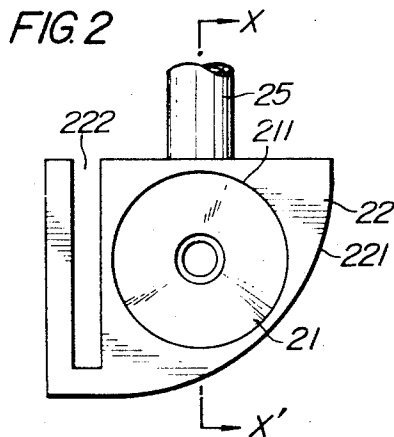
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## APPARATUS FOR CUTTING A RUNNING YARN IN A CENTRIFUGAL TYPE SPINNING MACHINE

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2 Claims

### ABSTRACT OF THE DISCLOSURE

An apparatus and method for cutting a running yarn, wherein the running direction of yarn is to be changed during the spinning in a centrifugal type spinning machine, by allowing said yarn to run in a nearly vertical, inclined state and making a knife move vertically from overhead.

This invention relates to an apparatus for cutting a running yarn, without disturbing spinning of the yarn, in order to readily change the running direction of yarn in a centrifugal type spinning machine, when the running direction of the yarn is to be changed so as to introduce the running yarn into a rotating pot or lead the yarn, which is running into the pot, to some other place.

Yarn, which has been spun in a centrifugal type spinning machine, is usually led into a pot, which is rotating at a high speed, through a funnel and then is formed into a cake. The formed cake is taken out of the pot, after the running yarn is cut and temporarily led to some other place and the rotation of the pot is stopped. After the cake has been taken out, the rotation of the empty pot is started, and the yarn is cut and introduced again into the pot through the funnel. The yarn is again run into the pot and formed into a cake. The foregoing operation is repeatedly conducted in the centrifugal type spinning machine.

In order to lead the running yarn into the pot from some other place or lead it temporarily from the pot to some other place, the yarn must be cut each time the running direction of yarn is to be changed. Cutting of the running yarn has been heretofore conducted manually. However, such a method is very primitive, and as each yarn from the respective godet must be cut manually, it is very hard to cut every yarn at the same time, and as a result the formed cake tends to have an uneven yarn length. The thus obtained product often becomes uneven. Further the cut yarn must be floated on the spinning bath or wound up on a stretching roller during the spinning. Thus, when the yarn is to be again introduced into the pot, the yarn must be taken out of the respective godet manually, and led through the funnel to the pot by passing the yarn through the funnel using the liquid. However, this is not easy, and much skill is required to introduce the yarn into the pot. Thus, the conventional manual operations are very inefficient.

When the formed cake is to be taken out of the pot, a method involving cutting the yarn manually with scissors or a knife is known for guiding and introducing the yarn, which is running into a pot, to another stand-by pot. In such a method, the yarn is always cut manually, and much skilled labor is required. Furthermore, as the stand-by pot must be provided for that purpose, such method is uneconomical even with respect to equipment cost.

Other techniques are also known which are complicated, uneconomical and/or inefficient.

An object of the present invention is to provide an

apparatus and a method for eliminating all of the above-mentioned drawbacks, and to facilitate cutting of the running yarn, the running direction of which is to be changed, by an apparatus comprising a yarn guide means for dislocating and cutting the running yarn, a cutter means for cutting the running yarn, and a liquid injection nozzle means.

In the drawing:

FIG. 1 is a perspective view of an apparatus showing an embodiment of the present invention; FIG. 2 is a plan view of a yarn guide means which is part of the present apparatus; FIG. 3 is a cross-sectional right side view of the yarn guide means along line X-X' of FIG. 2; and FIGS. 4 to 7 illustrate the actions of the present apparatus, in which FIG. 4 is a plan view showing the position of the present apparatus wherein the yarn is running into the pot; FIG. 5 shows the condition at which the running yarn is to be dislocated from the pot to some other place, FIG. 6 shows the condition at which the yarn is running into said other place after the yarn is dislocated and cut, and FIG. 7 shows the condition at which the running yarn is to be dislocated from said other place to the pot.

A mode of the practice is hereunder explained with reference to the drawings:

In FIG. 1, a yarn guide means 2 is provided just under the liquid injection means 1 provided just under the final stage godet (not shown in the drawing), and a cutter means 3 for cutting the yarn is provided in correspondence with said yarn guide means 2. The liquid injection nozzle means 1 is well known, and consists of a liquid injection nozzle 11 having yarn guide vanes 111, a yarn engagement part 112, a liquid injection outlet 113, and a liquid injection pipe 114, said liquid injection pipe 114 being connected to a liquid feed pipe (not shown in the drawing) which is provided horizontally from the left end to the right end of the spinning machine (not shown in the drawing) and is capable of moving a specific distance.

As shown in FIGS. 2 and 3, the yarn guide means 2 has a hopper, on the upper brim of which a yarn guide rim 22 having a smooth, curved brim 221 at the right outer side is provided as shown in FIG. 2, while part of the plate is cut away 7 to 3 mm. wide at the left straight side of the plate. Further, at the lower part of the hopper is provided a shield pipe 24 having a socket 241 and a yarn guide nozzle 23 by engaging the shield pipe 24 with the hopper by means of a screw socket 241. Further, the lower end of the shield pipe 24 is connected and fixed to the yarn guide pipe 25. To the yarn guide pipe 25 connected to the shield pipe is connected and fixed a liquid injection pipe 26 having a projected liquid injection nozzle 261 at the center at the right end of the yarn guide pipe 25 as shown in FIG. 3. The liquid injection pipe 26 is connected to the liquid feed pipe 27 by means of a cap nut, as shown in FIG. 1, the liquid feed pipe being provided horizontally from the left end to the right end of the spinning machine (not shown in the drawing) and capable of slightly sliding in a lateral direction. The other end of the yarn guide pipe 25, that is, the left end of the pipe as shown in FIG. 1, penetrates through a support plate fixed to the liquid feed pipe 27, and the tip of the yarn guide pipe 25 is bent downwards in L shape. A trough 29, which is inclined towards one end, is horizontally provided from the left end to the right end of the spinning machine (not shown in the drawing) under the tip of the yarn guide pipe 25, which is bent in L shape.

The cutter means 3 for cutting the yarn has a support 33 for supporting a knife 32 on a shaft 31 which is horizontally provided from the left end to the right end of the

spinning machine (not shown in the drawing) and is rotatable by a half turn. The support 33 is cylindrical and is engaged with the shaft. One end of the support has a projected part for fixing the knife 32 so that the edge of the knife may face the yarn guide means 2.

The liquid injection nozzle means 1, the yarn guide means 2, the cutter means 3 for cutting the yarn, etc. are operated by a single driving source (not shown in the drawing) with a synchronizing means (not shown in the drawing) provided at the outer wall of the spinning machine side.

The operation of the present apparatus is next explained with reference to the drawings. In FIG. 4, the yarn A, which is to be formed into a cake, is running from the final stage godet directly into a funnel 5. The liquid injection nozzle 11 is at the left side of the running yarn A; the tip of the knife 32 of the cutter means 3 for cutting the yarn is upright; and the yarn guide means 3 is at the right of the running yarn A, these means being at rest at some distance from the running yarn A, without disturbing spinning of the yarn A. When the formed cake is to be taken out of the pot, the liquid injection nozzle 11 slides to the specific position at the right side in FIG. 4, and the running yarn A is led to the yarn engagement part 112 through the yarn guide vanes 111 of the liquid injection nozzle. After the engagement, the yarn guide means 2 slides to the specific position at the left side in FIG. 4. Then, the running yarn A is pushed towards the left side by the brim of the yarn guide rim 22 of the yarn guide means 2, as shown in FIG. 5. The yarn is still running into the funnel 5. The center of the liquid injection nozzle 11 is vertically in line with the center of the hopper 21 of the yarn guide means 2. While the liquid is injected from both the liquid injection nozzle 11 of the liquid injection nozzle means 1 and the liquid injection nozzle 261 of the yarn guide means 2, the shaft 31 of the cutter means 3 for cutting the yarn is rotated by a half turn forwards from the overhead position. The knife 32 provided on the shaft 31 cuts the yarn A running in the inclined state over the yarn guide rim 22 at the intersection of the yarn with the knife by the rotation of the knife. Such operation is usually called "doffing." The yarn guide rim 22, when the yarn A is to cut, must be positioned so that the cut-away part 222 of the guide rim 22 may be located at the position of the knife 32. Accordingly, the knife 32 passes through said cut-away part 222. The thus cut yarn flows into the hopper 21 of the yarn guide means by the liquid injected from the liquid injection nozzle 11, as shown in FIG. 6, reaches the yarn guide pipe 25 in FIG. 1, and is discharged therefrom into the trough 29 by the liquid injected from the liquid injection nozzle 261 of the liquid injection pipe 26. That is, the yarn A which flowed into the hopper 21 together with the liquid is discharged into the center of the yarn guide pipe 25, because the tip of the guide nozzle 23 provided below the hopper 21 is projected nearly to the center of the yarn guide pipe 25, and the yarn is vigorously led and discharged into the trough 29 by the liquid injected from the liquid injection nozzle 261 of the liquid injection pipe 26 projected at the center of the yarn guide pipe 25. Accordingly, the yarn A never encounters any trouble during spinning the yarn A, such a trouble as adhesion of the yarn to the pipe wall, etc. The rotated knife 32 is returned to the original position while the yarn A is discharged in the trough 29.

When the yarn A, which is running into the yarn guide means 2, is to be introduced into the pot (not shown in the drawing) through the funnel 5, the yarn guide means 2, into which the yarn A is running, further slides to the specific position at the left side in FIG. 6, so that the yarn A may inclinedly run from the tip of the liquid injection nozzle 11 to the hopper 21, as shown in FIG. 7 and at the same time the tip of the liquid injection nozzle 11 may be vertically in line with the funnel 5. When the knife 32 is rotated by a half turn forward from the over-

head position while the liquid is injected from the liquid injection nozzle 11, the yarn A is cut at the intersection of the inclinedly running yarn A with the knife 32. In such a case, the yarn guide rim 22 must be positioned so that the right end of the yarn guide rim 22 may be located at the left side of the knife 32. The upper cut end of the thus cut yarn A is guided by the liquid injected from the liquid injection nozzle 11, and flows into the funnel 5 together with the liquid. In this way, the yarn A is introduced again into the pot (not shown in the drawing) and formed into the cake. When the yarn A is introduced into the pot (not shown in the drawing), the liquid injection is stopped, and the liquid injection nozzle 11 is returned to the original position as shown in FIG. 4. The knife 32 is also returned to the original position overhead. Though the yarn guide means 2 slides towards the original position at the right side, the yarn A, which is running into the pot (not shown in drawing), slides along the curved brim 221 of the yarn guide rim 22, when the yarn guide means 2 is returned to the original position as shown in FIG. 4.

In cutting the running yarn A to change the running direction of the yarn A, it must be noted that the yarn A cannot be cut simply by rotating the knife 32, but the rotating speed, that is, the moving speed and moving direction of the knife 32 plays an important role. However sharp the edge of knife 32 may be, a tension necessary for cutting the running yarn A is hardly applied to the running yarn A, so long as the rotating speed of the knife A is slower than the running speed of the yarn A, and consequently it is difficult to securely cut the yarn A to change the running direction. This is because the cross section of the yarn A consisting of a plurality of monofilaments is liable to be broken to pieces. Even if a single monofilament fails to be cut, it is difficult to change the running direction of the yarn A. Particularly, it is difficult to change the running direction of the yarn to introduce it into the pot for forming the cake. Further, unless the rotation of the knife 32, that is, the moving direction, coincides with the falling direction of the liquid injected from the liquid injection nozzle 11, that is, the vertical direction, for example, if the knife cuts the yarn A horizontally or inclinedly, the knife 32 interrupts the falling liquid injected from the liquid injection nozzle 11 at the moment when the knife cuts the yarn A, and scatters the liquid. As a result, the cut end of the thus cut yarn A springs back or vibrates for a moment, and the running of the yarn becomes unstable. At the same time, to change the running direction becomes difficult. The present inventors found, as a result of various experiments and studies, that, in order to readily change the running direction of the yarn, the yarn must be cut in a state as nearly vertical as possible by moving the knife in a vertical direction along the injected liquid to prevent the cut end of the yarn from springing back or vibration when the yarn is cut, and that the moving speed of the knife must be faster than the running speed of the yarn A, that is, provided that the moving speed of the knife 32 is  $W$ , the running speed of the yarn A is  $V$ , and  $W \geq 1.5V$ , the yarn A can be securely cut and the change of the running direction can be facilitated.

If the cutting speed of the yarn is that  $W < 1.5V$ , the yarn A cannot be securely cut, as explained above, and the change of the running direction becomes difficult.

As explained above, according to the present invention, the running yarn A can be securely cut, and the running direction of the yarn A can be readily and securely changed without bringing any trouble to spinning the yarn, if the yarn guide means 2 capable of slightly sliding in a lateral direction, the cutter means 3 for cutting the yarn in which the moving speed of the knife is made faster than the running speed of the yarn, and the well-known liquid injection nozzle means 1 are used. As a result, the labor required for changing the running direction of the yarn A is greatly saved and the thus

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obtained product can effectively have a uniform yarn length.

What we claim is:

1. In a centrifugal type spinning machine, apparatus comprising a liquid injection nozzle means adapted for sliding in lateral direction, and means for cutting a running yarn, said means comprising a hopper below the liquid injection nozzle means and including a yarn guide rim including a curved brim and a cut-away part, a yarn guide nozzle under the hopper including a shield pipe, a yarn guide pipe, said nozzle projecting into said guide pipe, a liquid feed pipe adapted for sliding in lateral direction, a liquid injection pipe branching from the liquid feed pipe and including a liquid injection nozzle, the liquid injection nozzle of the liquid injection pipe also projecting into the yarn guide pipe, a rotatable shaft, and a knife on the shaft and positioned over the cutaway part.

2. Apparatus as claimed in claim 1, wherein said knife

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is adapted for rotatably moving in vertical direction at a moving speed at least 1.5 times as fast as the running speed of a yarn.

#### References Cited

##### UNITED STATES PATENTS

1,949,604	3/1934	Dreyfus et al. ....	57—34
3,333,407	8/1967	Bruin et al. ....	57—52
3,343,358	9/1967	Nussbaum .....	57—34

##### FOREIGN PATENTS

656,605	1/1963	Canada.
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JOHN PETRAKES, *Primary Examiner.*

U.S. Cl. X.R.

57—34.5, 76.