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3,261,562

SUCTION TUBE FOR TEXTILE MACHINES

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2 Sheets-Sheet 1

FIG.2

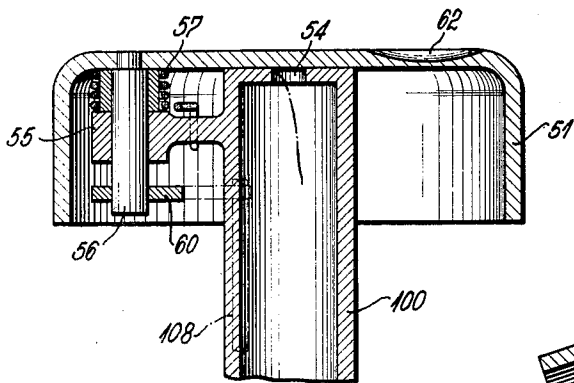


FIG.3

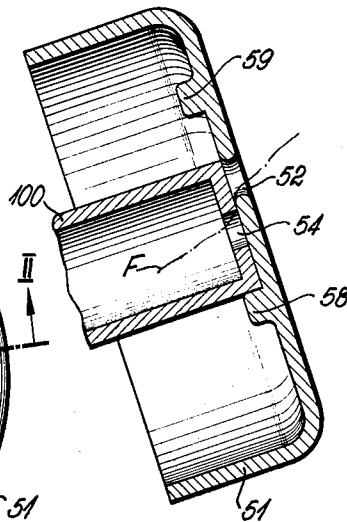
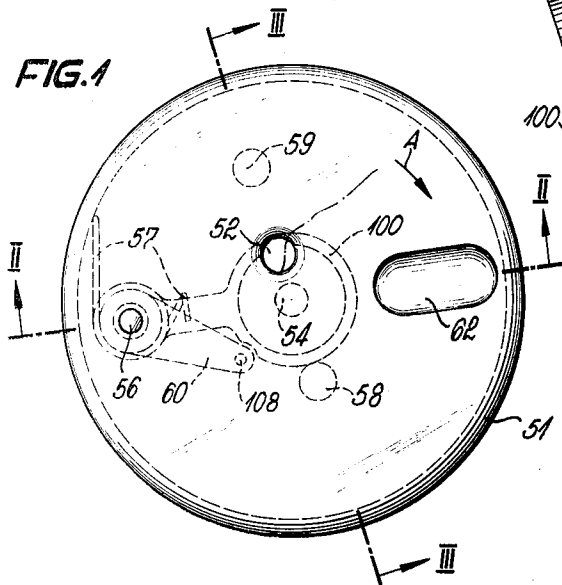


FIG.1



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SUCTION TUBE FOR TEXTILE MACHINES

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10 Claims. (Cl. 242—35.6)

My invention relates to a suction tube for textile machines and more particularly to a suction tube of the type having an orifice formed in a smooth flat plate.

Suction tubes are employed for very many purposes in textile machines, for example for cleaning specific machine components, for seizing and readying yarn ends, for removing surplus or severed yarn ends by suction, and the like. In this connection it is also well known to movably support the suction-tube nozzle so as to be able to direct it to a predetermined location for example where it can temporarily exercise a suction effect. It is also known to place the end orifice of the suction tube in a smooth flat plate generally having a plane surface, but which can also be curved, such as a concave, convex or wavy surface for example.

It is an object of my invention to provide a suction tube for textile machines by means of which the introduction of yarns and fiber lengths into the suction-tube nozzle is essentially facilitated and which provides a distinct improvement over the corresponding devices employed heretofore.

It is another object of my invention to provide a suction-tube nozzle with sealing means which simplify the introduction of yarns or the like into the suction-tube orifice.

It is a further object of my invention to provide the suction tube opening in a smooth and flat plate which avoids projecting edges and corners in the vicinity of the suction-tube opening so that no yarns can wind around the corners and edges or be entangled with a protruding part and all of the yarns that reach the plate are reliably sucked into the opening of the tube.

With the above and other related objects in view, and in accordance with my invention, I provide a suction tube with an end plate which is mounted for movement relative to the nozzle end of the suction tube for opening and closing the same. Means for sealing the suction-tube orifice can be provided which functions in accordance with movement of the plate relative to the suction-tube nozzle. It is well known that innumerable suction tubes in textile machinery are operable only for a short time and serve no operational function for a rather lengthy interval. For this reason, the suction tube orifice is provided with a sealing member which is opened only when the suction tube is in actual operation. Since the plate provided with the suction-tube orifice in accordance with my invention is mounted for movement relative to the nozzle end of a suction tube, the displacement of the plate serves for actuating the sealing means.

According to a further aspect of my invention, I provide a plate having a suction-tube orifice and mounted pivotably or slidably directly in front of the open end of the suction tube so that it can itself serve as the sealing means for the suction tube.

In accordance with an additional aspect of my invention and in order to facilitate the introduction of yarns or the like into the suction-tube opening, I provide a plate which is movable against the restoring force of a spring for example and which is provided with at least one stop member connected directly or indirectly with the suction tube. The device is accordingly so constructed that the opening formed in the plate is located in front of the

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suction-tube orifice only in the operative position of the plate whereas in the inoperative position of the plate, the suction-tube orifice is covered by the plate. The operator thus has merely to slide the plate against the restoring or biasing force of the spring in order to bring the opening formed in the plate into alignment with the suction-tube orifice. The yarn end is then laid on the plate and is immediately sucked into the tube. As soon as the operator lets the plate go, the opening in the plate is again moved away from the suction-tube orifice and the plate then closes the suction-tube orifice. Thus a yarn length which may project out of the opening in the plate and extend to a yarn coil can be clamped between the plate and the suction-tube end.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention has been illustrated and described as embodied in a suction tube for textile machines, it is nevertheless not intended to be limited to the details shown since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope of range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof, will be best understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

FIG. 1 is a top plan view of the plate constructed in accordance with my invention showing the suction tube in dotted lines;

FIG. 2 is a sectional view of FIG. 1 along the line II—II taken in the direction of the arrows;

FIG. 3 is a sectional view of FIG. 1 along the line III—III taken in the direction of the arrows; and

FIG. 4 is a schematic, partly sectional view of a textile machine in which the suction tube of my invention is incorporated.

Referring now to the drawings and particularly to FIGS. 1 to 3, there is shown a plate 51 which is provided with an opening 52 in its flat smooth face. The plate 51 is movably mounted on one end of a suction tube 100 which is provided with an end orifice 54. In the embodiment illustrated in these figures, the plate 51 is pivotable about a pin 56 suitably supported in an eccentric arm 55 extending transversely to the longitudinal axis of the suction tube 100. The pin 56 is turnably mounted in a bore formed in the arm 55 and is secured rigidly at one end to the plate 51. A torsion spring 57 abutting the arm 55 at one end and the side of the plate 51 at the other end is constrained to turn the plate 51 about the pin 56 in a counterclockwise direction. This turning movement is limited by a stop member 58 consisting of a boss projecting on the inside of the plate 51 when it abuts the suction tube 100. An additional stop member 59 similarly limits the turning movement of the plate 51 in opposition to the force applied by the spring 57, that is, limits the turning movement in the clockwise direction.

As can be seen most clearly in FIG. 3, in the rest position of the plate 51, the suction-tube orifice 54 is covered by the plate 51, i.e. the opening 52 is not aligned with the suction-tube end orifice 54. However, when the plate 51 is pivoted clockwise about the pin 56 in the direction of the arrow A shown in FIG. 1, against the restoring force of the spring 57 and until the stop member 59 abuts the suction tube 100, then the opening 52 in the plate 51 reaches a position in which it is directly above the suction-tube end orifice 54 and the suction tube is accordingly opened. A yarn F can consequently be sucked into the tube 100 and when the suction tube opening 54 is closed by the reset spring 57, the yarn F becomes clamped between the plate 51 and the end of the suction

tube 100 as shown in FIGURE 3. In order to slide plate 51 more easily, its upper surface can be provided with suitable contours, for example one or more concave recesses 62, which can be readily gripped by the operator's fingers.

A particularly advantageous application of the device constructed in accordance with my invention is illustrated in FIG. 4. In FIG. 4, there is shown a textile machine having a plurality of reserve yarn coils such as spinning cops suitably located in a magazine, the yarn ends of the coils being held ready within a suction tube. The structure and operating principles of such an apparatus are described in Patent No. 3,059,867, issued on October 23, 1962 and in the copending application Serial No. 355,585 of Stefan Furst filed on March 30, 1964.

As shown in FIG. 4, a yarn guiding drum 2 is carried on a shaft 1 and is in engagement with a take-up spool 4 journalled on a carrier frame 3. The take-up spool 4 is frictionally driven by the yarn guiding drum 2. The yarn F is accordingly unwound from the supply coil or cop 5 and wound up on the take-up spool 4. Two yarn seeking suction tubes or arms 6 and 10 feed the yarn ends to a knotting device 9 when a yarn break occurs between the tensioner 19 and the take-up spool 4. An additional yarn seeking arm 11 feeds the yarn from a supply coil 5 into the vicinity of the yarn seeking suction tube 10 which accordingly delivers it to the knotting device when the supply coil is to be replaced. There is furthermore shown a circular magazine 20 for supply cops which is coaxially mounted on a suction tube 100. In this supply coil magazine 20 the supply coils are contained in shells or compartments which in turn are mounted for rotation about the suction tube and are rotated through one sector or division by well known and conventional stepping devices, such as a ratchet and pawl assembly, whenever the supply coil is replaced. At one location of this supply-coil magazine an opening 204 is provided which is usually closed by a lid 205. The lid 205 is at one end of a centrally pivoted rocker arm whose other end is pivoted at one end of an elongated rod 207. The other end of the rod 207 is pivotably connected to one end of a centrally pivoted double arm lever 206. The free end of the double arm lever 206 engages and follows the contour of a cam 111 for suitably opening and closing the lid 205. A chute 202 is located beneath the opening 204 of the supply-coil magazine 20, the respective supply coil being able to slide down the chute 202 onto the pivoted supply coil mandrel 5a when the lid 205 is opened.

In FIGS. 1 to 3, there is shown in enlarged view the device constructed in accordance with my invention mounted on a suction tube 100. The plate 51 which closes the end of the suction tube 100 can be opened in relation to the textile machine cycle instead of by hand. With this purpose in mind, a swivel arm 60 is provided which is pivotable about the pin 56 and, as shown in FIG. 1 by the broken lines, is actuated by the rod 108 which is in turn connected in any suitable manner known to the man of skill in the art to the textile machine to provide the desired motion. As shown in FIG. 4, in order to prevent any obstacle to the rotary movement of the shells or compartments 201, the part of the rod 108 which extends alongside of the suction tube 100 is mounted in elongated slots in the bearing 61 which is secured to the suction tube 100. The rod 108 is controlled by the cam 111 engaged by one end 110 of a centrally pivoted double lever 109 whose other end is pivotably connected to the free end of the rod 108. As is shown in FIGS. 2 and 3, the plate 51 is cup-shaped so that it covers the cooperating components 55, 56, 57, 60 which actuate its movement at the top and at the sides, as seen particularly in FIG. 2, so that no yarn lengths can be accidentally caught therein. After a supply coil 5 is unwound, the empty core is discarded in a manner such as is shown and described in Patent No. 3,111,280 of Walter Reiners et al., and the mandrel 5a is pivoted slightly in the clock-

wise direction as shown in FIG. 4 to such an extent that a reserve supply coil 5', 5'' can slide out of the supply-coil magazine 20 down the chute 202 onto the mandrel 5a. The downward movement of the supply coil 5' from the supply-coil magazine 20 on the chute 202 is effected by the fact that when the supply coil is to be replaced, as described for example in the aforementioned Patent No. 3,111,280, the cam 111 is placed in rotation so that the double lever 206 is pivoted counterclockwise as shown in FIG. 4 when following the contour of the cam lobe 111a of the cam 111, and this movement is conveyed through the rod 207 to effect a pivoting motion in the clockwise direction of the double lever arm 208 which carries the lid 205.

When the supply coil 5' from the supply-coil magazine 20 is mounted on the mandrel 5a, the mandrel 5a pivots again back to the position illustrated in FIG. 4. Since the yarn end is still held in the suction tube 100, the yarn at this stage extends slidingly through a slot 20a of the supply-coil magazine from the suction tube 100 to the head of the coil. Control means that are not illustrated but that are well known from Patent No. 3,059,867, for example, then cause the arm 11 to pivot to the position shown in phantom in FIG. 4. Since the arm 10 is pivoted downwardly in the meantime to the phantom position also shown in FIG. 4, the yarn that is carried upwardly by the arm 11 can then be grasped by the suction nozzle of the suction arm 10 and delivered to the knotting device 9. The yarn end of the take-up spool 4 is simultaneously conveyed by the suction arm 6 to the knotting device 9 so that both yarn ends can be knotted together. At the end of the knotting operation, the yarn extending from the knotting device to the opening of the suction tube 100 is severed by unillustrated means such as are disclosed in the aforementioned Patent No. 3,059,867. The plate 51 is simultaneously pivoted by the cam 111 through the linkages consisting of the double arm lever 109, 110 and the rod 108 and the pivot arm 60, because shortly before the end of the supply-coil replacement operation, that is, shortly before the dwell position of the cam 111 shown in FIG. 4 is reached, the double lever 109, 110 is pivoted by the cam lobe 111a counterclockwise. The end orifice of the suction tube 100 is thereby opened and the severed yarn end that was clamped therein is freed so that it can be sucked into the suction tube 100. In addition, the opening of the suction tube 100 for a short period each time after a supply-coil replacement permits the yarn with the coils 5', 5'' to travel around the suction tube 100 and to take a suitable position when the supply coil is replaced in a manner described in the aforementioned copending application Serial No. 355,585 of Stefan Furst filed on March 30, 1964.

By employing an embodiment of my invention as illustrated in FIG. 4, the starting end of the yarn of the reserve supply coils 5' and 5'' can be easily fed into the end orifice of the suction tube 100 without any danger arising of possibly entangling the yarn length leading to the reserve or supply coil about any projecting portions or edges thereof. It is also within the scope of my invention to employ instead of a circular magazine as is illustrated in FIG. 4 also a straight-line magazine as is for example shown and described in the aforementioned Patent 3,059,867.

As has been mentioned before, it is not mandatory that the plate be provided with a flat upper surface but rather the upper surface can also be curved or wave-shaped. In order to avoid entanglement of the yarn it is primarily necessary that the plate be provided with a smooth surface having no sharp edges or projections.

I claim:

1. In a textile machine, in combination, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, and plate means having a smooth surface and formed with an opening, said plate means

being mounted at said one end of said suction tube for relative movement with respect to the end orifice in a direction transverse to said suction tube so as to relatively move said end orifice and said opening in said plate means in and out of alignment with each other, magazine means for holding a plurality of wound yarn coils, and means for relatively moving said end orifice and said opening in said plate means into alignment for entraining respective yarn ends of said plurality of coils in said suction tube.

2. In a textile machine, in combination, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, and plate means having a smooth surface disposed transversely to the axis of said tube and formed with an opening, said plate means being pivotably mounted at said one end of said suction tube for relative pivoting movement with respect to the end orifice in a direction transverse to said suction tube so as to relatively move said end orifice and said opening in said plate means in and out of alignment with each other and circular magazine means for holding a plurality of wound yarn coils, said circular magazine means being coaxially mounted on said suction tube so that respective yarn ends of said coils are entrainable in said suction tube when said end orifice thereof and said opening in said plate means are in alignment.

3. In a textile machine, in combination, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, and plate means having a smooth surface disposed transversely to the axis of said tube and formed with an opening, said plate means being slidably mounted at said one end of said suction tube for relative sliding movement with respect to the end orifice in a direction transverse to said suction tube so as to relatively move said end orifice and said opening in said plate means in and out of alignment with each other and circular magazine means for holding a plurality of wound yarn coils, said circular magazine means being coaxially mounted on said suction tube so that respective yarn ends of said coils are entrainable in said suction tube when said end orifice thereof and said opening in said plate means are in alignment.

4. In a textile machine, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, a plate having a smooth outer surface disposed transversely to the axis of said tube and formed with an opening, said plate being mounted on said one end of said suction tube and slidable relative to the end orifice of said suction tube so as to relatively slide said end orifice and said opening in said plate in and out of alignment with each other, and biasing means for normally urging said plate to a position in which said plate opening is out of alignment with said suction tube orifice, magazine means for holding a plurality of wound yarn coils, and means for relatively moving said end orifice and said opening in said plate means into alignment for entraining respective yarn ends of said plurality of coils in said suction tube.

5. A yarn end seizing device according to claim 4, including stop means for limiting the relative sliding movement of said plate and said suction tube orifice.

6. A yarn end seizing device according to claim 4, including at least one stop member provided on said plate, said stop member being engageable with said suction tube for limiting the relative sliding movement of said plate and said suction tube orifice.

7. In a textile machine, in combination, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, a plate having a smooth outer surface disposed across said orifice and formed with an opening, said plate being mounted at said one end of said suction tube and being slidable in a direction transverse to said suction tube from an operative position in which said tube orifice and said plate opening are in alignment and a rest position in which said tube orifice is out of alignment with said opening and closed by said plate, magazine means for holding a plurality of wound yarn coils, and means for relatively moving said end orifice and said opening in said plate means into alignment for entraining respective yarn ends of said plurality of coils in said suction tube.

8. In a textile machine, in combination, a yarn end seizing device comprising a suction tube having an orifice at one end thereof, a cup-shaped plate having a smooth top surface and formed with an opening through said surface, said plate being disposed across said orifice, pivot pin means carried by a substantially radial extension of said suction tube and extending substantially coaxially to said tube, spring means mounted on said extension for normally urging said plate to a position in which said orifice is closed by said plate, magazine means for holding a plurality of wound yarn coils, and means for pivoting said plate in a direction transverse to said suction tube to a position in which said plate opening is in alignment with said suction tube orifice for entraining respective yarn ends of said plurality of coils in said suction tube, said spring means and said pivot pin means being enclosed at the top and sides by said cup-shaped plate.

9. A yarn end seizing device according to claim 1, said means for moving said plate means and said suction tube orifice relative to each other comprising manual means.

10. A yarn end seizing device according to claim 1, said means for moving said plate means and said suction tube orifice relative to each other comprising mechanical means connected to automatic control mechanism of the textile machine.

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