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STUFFING BOX CRIMPER

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Fig. 1

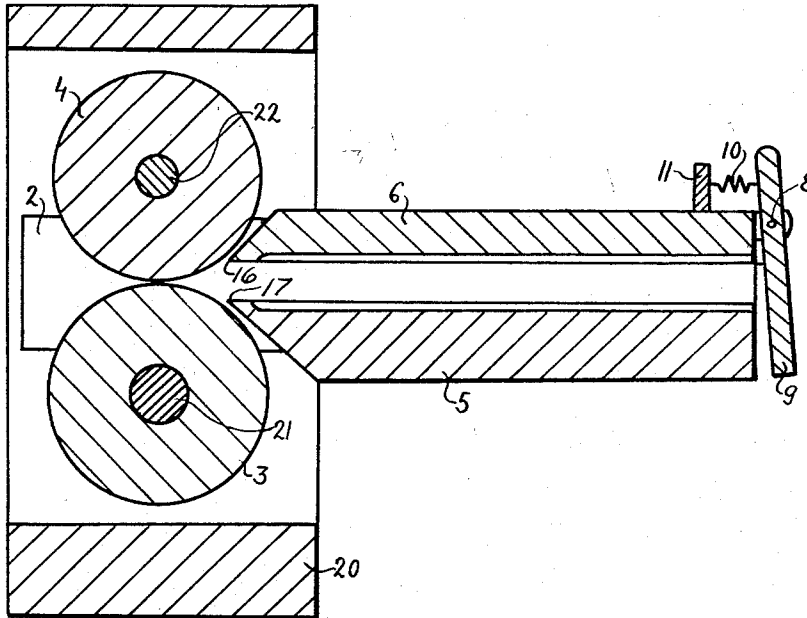
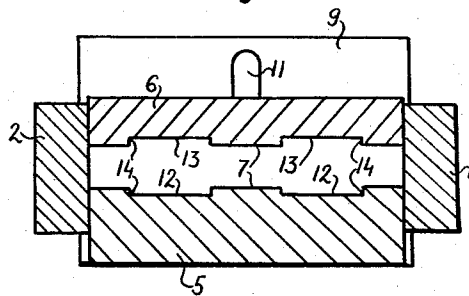


Fig. 2



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STUFFING BOX CRIMPER

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5 Claims. (Cl. 28—1)

The present invention is concerned with the inner arrangement of the stuffing box of a machine for crimping synthetic fibre tows.

The stuffing boxes hitherto known for crimping synthetic fibre tows with a great number of fibres have usually a rectilinear section, into which a synthetic fibre tow is pressed by means of a pair of pressure rollers, situated in front of the stuffing box. On the opposite end, the stuffing box is usually provided with a tiltable lid for opening and closing the outlet of the box and thereby controlling the pressure in the stuffing box, whereby the number of crimps in one unit length of the synthetic fibre tow is controlled. When the lid is open, the crimped synthetic fibre tow leaves the stuffing box for further processing. The stuffing box itself consists substantially of two side walls joined by top and bottom walls. The inwardly directed surfaces of the side, top and bottom walls of said stuffing box are smooth.

The disadvantage of these stuffing boxes is based upon the considerable friction exerted by the synthetic fibre tow on the smooth inner walls, whereby the pressure in the box rises to an undesirable level. This pressure varies during the process and is uncontrollable, resulting in considerable irregularity in crimping of the synthetic fibre tow. Experiments have shown that control of the number of crimps per unit length by means of the tiltable stuffing box lid is almost ineffective and works only in a very narrow range. The undesirable pressure in the stuffing box, i.e. the pressure caused by the effect of the friction of the synthetic fibre tow against the smooth inner walls of the stuffing box, is caused mainly by the fact that the pressure cylinders force the synthetic fibre tow into frictional engagement with the side walls. The resulting considerable friction against these side walls causes their abrasion by the synthetic fibre tow, resulting in failure and down-time of the crimping machine. To press the synthetic fibre tow into the stuffing box, i.e. to overcome the undesirable pressure in the stuffing box, the pressure rollers must exert high pressure which in turn necessitates a considerable input of electric power. The crimping machine is very sensitive to the penetration of knots, bunching of the material, and the like which press the pressure rollers away from each other and thereby cause irregularity in the pressure in the stuffing box and which in turn results in low quality crimped synthetic fibre tow. Variations of the pressure in the stuffing box are also indicated by slacks in the incoming fibre tow in front of the pressure rollers, causing an irregular operation of the crimping machine.

The present invention is concerned with overcoming said disadvantages inasmuch as the inwardly directed surfaces of the top as well as the bottom wall are provided with one or more longitudinal grooves having advantageously a square, rectangular or semi-circular section.

The advantage of a stuffing box according to the present invention resides in the decrease of pressure exerted on the side walls of the stuffing box. Tests have shown regularity of pressure inside the stuffing box even when knots and the like penetrate into it. Furthermore, the crimp regularity of the synthetic fibre tow has been greatly improved. The tests proved, moreover, high sensitivity of the lid adjustment with respect to the number of crimps. Another advantage resides in the substantially diminished

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wear of the side walls. The drop in the pressure exerted on the side walls also permits reduction of the force necessary for pressing the fibre tow into and through the stuffing box, said pressure drop resulting in diminishing the force input necessary for the novel box by comparison with a conventional stuffing box with smooth inner walls.

An exemplary embodiment of the present invention is shown in the accompanying drawings, in which FIG. 1 represents a diagrammatic longitudinal section of the stuffing box with the pressure rollers and FIG. 2 a cross section of the stuffing box shown in FIG. 1.

The stuffing box consists substantially of two side walls 1 and 2 arranged in parallel with one another and engaging near the entrance of the stuffing box the pair of pressure rollers 3 and 4. The interior space or crimping chamber 7 is further defined by the bottom wall 5 and the top wall 6, these latter walls being fixed to the side walls e.g. by means of screws (not shown). A lid 9 is secured to the top wall 6 at the outlet end of the box, and is tiltable about a pivot point 8 against the action of a spring 10 whose one end is connected to the lid 9 and whose other end is secured to a bracket 11 which in turn is fixed to the top wall 6. The inner surface of bottom wall 5 is provided with at least one, and preferably with two longitudinal grooves 12. Also, the inner surface of top wall 6 is provided with at least one, and preferably with two grooves 13. The width of the longitudinal grooves 12 and 13 is advantageously chosen in such a way that if the bottom wall 5 and the top wall 6 are each provided with only one groove 12 and 13, respectively, the distance between the side faces 14 of the grooves 12 or 13 and the side walls 1, 2 of the stuffing box is shorter than the spacing between the respective side faces 14 of each groove 12 or 13. If a higher number of longitudinal grooves 12, 13 is provided in the walls 5 and 6, the distance between the side walls 1 and 2 of the stuffing box and the two most distant side faces 14 of the grooves is smaller than the spacing between these side faces 14 of the individual grooves 12 or 13.

In cross section the grooves 12, 13 can be e.g. square, rectangular, semi-circular, etc. Advantageously, the grooves 12, 13 start near the edges 16 and 17 of top wall 6 and bottom wall 5, respectively, and end at or in the proximity of the outlet of the box.

The stuffing box is connected with the frame 20 of the crimping machine, in which two pressure rollers 3 and 4 are mounted on the shafts 21 and 22, said pressure rollers being driven by a driving mechanism (not shown), e.g. an electric motor.

The device according to the present invention works as follows:

The synthetic fibre tow (not shown) is pressed by means of the pressure rollers 3 and 4 into the crimping chamber 7 of the stuffing box, where it is folded by the pressure, generated by the continuous feeding of additional fibre tow in such a way that so-called "crimps" are formed on the individual fibres. While this "crimping" occurs, the tow passes through the crimping chamber 7 of the stuffing box toward the outlet and leaves the chamber 7 by being pressed out below the lid 9. It is then ready for further processing. The pressure exerted by the following tow fed by the pressure rollers 3 and 4 causes the tow in chamber 7 to fill the entire width of the latter and to exert thereby a considerable pressure not only against bottom wall 5, top wall 6, and lid 9, but mainly against the side walls 1 and 2. In the novel box, this pressure causes the tow to penetrate into the longitudinal grooves 12 and 13 of the walls 5 and 6 whose side faces 14 act as guide surfaces for the crimped tow and prevent movement of the synthetic fibre tow towards the side walls 1 and 2, diminishing thereby the pressure against the side walls 1, 2 and reducing the undesirable pressure in the stuffing box. The

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pressure level in the crimping chamber 7 is controlled in dependence upon the desired number of crimps per unit length of the synthetic fibre tow by changing the prestress value of spring 10 acting on lid 9.

The present invention can be employed in all such crimping machines for crimping synthetic fibre tows which are provided with a stuffing box comprising side walls joined by a top and a bottom wall.

I claim:

1. An apparatus for crimping fibrous tow, comprising a stuffing box including a pair of spaced opposed long walls and a pair of spaced opposed short walls defining a channel having an inlet and an outlet; elongated feed means located adjacent to said inlet extending in direction of said spaced opposed long walls for introducing the fibrous tow through said inlet at such rate of feed that the tow tends to accumulate and expand in all directions in said channel; yarn restraining means associated with said channel; and at least two grooves in one of said spaced opposed long walls extending in the direction from said inlet to said outlet of said channel and spaced from said spaced opposed short walls so as to impede expansion of said tow in said channel in direction towards said spaced opposed short walls, thereby preventing undesired pressure of said expanding tow against said short walls and thus reducing the friction between said short walls and said tow.

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2. Apparatus as defined in claim 1, wherein the spacing between said spaced opposed long walls is considerably less than the spacing between said spaced opposed short walls.

3. Apparatus as defined in claim 1, wherein said grooves are of rectangular cross section.

4. Apparatus as defined in claim 1, and further comprising at least two further grooves provided in the other of said spaced opposed long walls and extending in direction from said inlet to said outlet spaced from said spaced opposed short walls.

5. Apparatus as defined in claim 4, wherein said further grooves in said other of said spaced opposed long walls are arranged opposite said grooves in said one of said spaced opposed long walls.

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