MANUFACTURE OF NEEDLE CYLINDER FOR CIRCULAR KNITTING MACHINE

Filed March 4, 1959

FIG. 1.

FIG. 2.

INVENTORS

INVENTORS
MANUFACTURE OF NEEDLE CYLINDER FOR CIRCULAR KNITTING MACHINE

The present invention relates to an improved method of making needle cylinders for circular knitting machines which are provided with steel ribs inserted in external axial grooves of the needle cylinder throughout its length so as to laterally guide the needles.

In circular knitting machines, more particularly in automatic stockinette machines, it is known to use fluted needle cylinders as well as steel ribs which are inserted into the moulded cylinder fluting. According to one of the known arrangements, the steel ribs are held at one end in a dove-tailed circular groove of the cylinder and are secured against falling out by segment discs fixed beneath the other end of the ribs on the needle cylinder. However, this fixing arrangement of the ribs is cumbersome and expensive.

According to another known arrangement, the steel ribs provided for lateral guidance of the needles are pressed home into the moulded flutes of the needle cylinder and are fastened in place by brazing or soldering. However, this fastening method for the ribs does not lend itself to accurate positioning of the ribs, resulting in an unequal size of the stockinette meshes. This method is also time consuming, as thorough mechanical cleaning of the rib walls for the purpose of removing the solder is necessary in order to prevent premature wear of the needle butts and latches, as well as detrimental heating of the needle cylinder during operation.

The present invention aims at overcoming the above mentioned drawbacks.

The primary feature of the present invention resides in securing the steel ribs in the radial faces of the needle cylinder by flowing the material of the needle cylinder itself. Preferably, a portion of the material of the needle cylinder is flowed into recesses at both ends of the steel ribs at the same time. A preferred device for carrying out the flowing operation consists of two punches which are guided co-axially in the needle cylinder and are provided with annular projections whose shape corresponds to the shape of the recesses of the steel ribs.

Further details of the arrangement according to the present invention will be obvious from the following description of an embodiment given merely by way of example and illustrated in the accompanying drawings wherein:

Fig. 1 shows a longitudinal section of a needle cylinder fitted on the punches of a pressing attachment, as positioned after completion of the pressing operation.

Fig. 2 shows a side view of a steel rib of the apparatus of Fig. 1.

Fig. 3 is an enlarged view of the detail “A” in Fig. 1 as positioned before the pressing operation.

Fig. 4 shows a fragmentary view of the needle cylinder according to Fig. 3, without the upper punch.

Fig. 5 is an enlarged view of the detail “B” in Fig. 1 as positioned before the pressing operation.

Fig. 6 shows the device of Fig. 3 after the completion of the pressing operation.

Fig. 7 is a fragmentary plan view of the needle cylinder according to Fig. 6 after the completion of the pressing operation, the upper punch being removed.

Fig. 8 shows the device of Fig. 5, after the completion of the pressing operation.

Referring now to the drawings, the steel ribs 1 of rectangular cross section are partly inserted into machined longitudinal grooves 2 of the needle cylinder 3 for laterally guiding the needles between adjacent ribs. The length of the individual ribs 1 is equal to the length of the needle cylinder 3 so that the bottom face 4 and the top face 5 of the needle cylinder are respectively in alignment with the bottom end 6 and top end 7 of each inserted rib 1. The bottom end 6 and top end 7 of each rib 1 is provided with a respective recess 8, 8’. The recesses 8 and 8’ are arranged opposite each other so as to be at the same distance from the base 9 of the rib 1 or the bottom 10 of the corresponding groove 2 of the cylinder 3. Each recess 8 and 8’ is of triangular cross section and has an inner wall 11, 11’ and an outer wall 12, 12’.

The device for spreading a portion of the material of the needle cylinder 3 over the inner walls 11, 11’ of the recesses 8, 8’ of all inserted ribs 1 consists of two punches 13, 14 co-axially inserted in the needle cylinder 3. The stepped cylindrical portion 15 of the bottom punch 13 internally supports the needle cylinder 3 and the bore 16 of the bottom punch 13 guides a heavy pin 17. The punches 13, 14 are provided with terminal flanges having oppositely arranged flat respective faces 21, 22, and on said faces sharp-edged annular projections 18, 19 located opposite the recesses 8, 8’ in the assembled condition of the device and shaped to mate a radially inward portion of said recesses. The inner walls 20, 20’ of the rings 18, 19 are parallel to the inner walls 11, 11’ of the recesses 8, 8’ of the ribs 1.

The two punches 13, 14 act on the needle cylinder 3 as follows: the needle cylinder 3 with the inserted ribs 1 is slipped over the stepped cylindrical portion 15 of the bottom punch 13 until the bottom face 4 of the needle cylinder 3 rests on the upper face 10 of the punch 13. The ring 19 of the top punch 14 is similarly placed on the upper face 5 of the needle cylinder 3. When the punches are then moved axially towards each other, the rings 18, 19 penetrate into the faces 4 and 5 of the needle cylinder 3 as well as into the recesses 8, 8’ of the ribs 1, until the flat faces 21, 22 of the punches 13, 14 abut against the respective faces 4, 5 of the needle cylinder 3.

The area of the cross section of the annular projections 18, 19 is approximately one-half of that of the recesses 8, 8’, and only the inner walls 20, 20’ of the annular projections 18, 19 displace portions of the needle cylinder material. The displaced material flows over the inner walls 11, 11’ of the recesses 8, 8’ of the ribs 1, but because of the abutment of the flat punch faces 21, 22 against the faces 4, 5 of the needle cylinder 3, the inner walls 20, 20’ remain spaced from the inner walls 11, 11’ of the recesses. The remaining clearances between the inner walls 11, 11’ of the recesses 8, 8’ and the inner walls 20, 20’ of the annular projections 18, 19 are filled with portions 23 of needle cylinder material which are flowed laterally from their original location. After completion of the pressing operation these material portions form triangular tongs 24 over the inner walls 11, 11’ of the recesses 8, 8’ of the ribs 1. Thus, the inserted ribs 1 of the needle cylinder are integrally locked in at both ends by a cold-forming operation. The pressure exerted on the inner walls 11, 11’ of the recesses 8, 8’ of the ribs 1 during the pressing operation has a relatively large radial component in a direction towards the longitudinal axis of the needle cylinder 3, thus forcing the base 9 of each rib 1 into firm contact with the bottom 10 of the corresponding groove 2 of the needle cylinder 3. It is not indispensable for the recesses 8, 8’ of the ribs 1 to be of triangular or generally polygonal shape, as rounded-off shapes such as semi-circular shapes are likewise suitable.

What is claimed is:

1. A method of simultaneously securing a plurality of elongated ribs in respective conforming axial grooves in the axial outer peripheral surface of an elongated...
body of flowable material having an axis, the grooves extending between two radial faces of said body and defining wall elements of said body therebetween, the ribs being substantially axially coextensive with said grooves, where the radially extending longitudinal end faces of said ribs are substantially flush with said radial body faces when the ribs are inserted in said grooves, the method comprising forming transverse notches in respective radially central portions of said end faces of said plurality of ribs; inserting each of said ribs in a respective one of said grooves with said notches extending from one to the other of said wall elements; simultaneously exerting axial flowing pressure on both ends of said elongated body against the two radial face portions of each of said wall elements adjacent said notches, and confining the material of said portions in such a manner as to cause the same to flow under said pressure into said notches and partly to fill the same, whereby said ribs are radially and axially secured in said grooves.

2. A method of simultaneously securing a plurality of elongated ribs in respective conforming axial grooves in the axial outer peripheral surface of an elongated body of flowable material having an axis, the grooves extending between two radial faces of said body and defining wall elements of said body therebetween, the ribs being substantially axially coextensive with said grooves, whereby the radially extending longitudinal end faces of said ribs are substantially flush with said radial body faces when the ribs are inserted in said grooves, the method comprising forming transverse notches in respective radially central portions of said end faces of said plurality of ribs, said notches each having an internal wall facing outwardly of said notch and laterally of said rib, inserting each of said ribs in a respective one of said grooves with said internal walls extending from one to the other of said wall elements and facing axially and radially outward of said groove; simultaneously exerting axial flowing pressure on both ends of said elongated body against the two radial face portions of each of said wall elements adjacent said notches, and confining the material of said portions in such a manner as to cause the same to flow under said pressure into said notches and to cover said respective internal walls thereof, whereby said ribs are radially and axially secured in said grooves.

3. A method of simultaneously securing a plurality of elongated ribs in respective conforming axial grooves in the axial outer peripheral surface of a needle cylinder for a circular knitting machine, the cylinder being of flowable material and having an axis, the grooves extending between two radial faces of said cylinder and defining wall elements of said cylinder therebetween, the ribs being substantially axially coextensive with said grooves, whereby the radially extending longitudinal end faces of said ribs are substantially flush with said radial body faces when the ribs are inserted in said grooves, the method comprising forming transverse notches in respective radially central portions of said end faces of said plurality of ribs, said notches each having an internal wall facing outwardly of said notch and laterally of said rib; inserting each of said ribs in a respective one of said grooves with said notches extending from one to the other of said wall elements; simultaneously exerting axial flowing pressure on both ends of said elongated body against the two radial face portions of each of said wall elements adjacent said notches, and confining the material of said portions in such a manner as to cause the same to flow under said pressure into said notches and to cover said respective internal walls thereof, whereby said ribs are radially and axially secured in said grooves.

References Cited in the file of this patent

UNITED STATES PATENTS

515,954 Drenn Mar. 6, 1894
1,046,928 Zenk Dec. 10, 1912
1,318,092 Lockwood Oct. 7, 1919
1,966,663 Drake July 17, 1934
2,101,537 Every Dec. 7, 1937
2,138,404 Haas Nov. 29, 1938
2,881,646 Farr et al. Apr. 14, 1959