BOWLING PIN COVER AND METHOD FOR MAKING SAME

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This invention relates to an improved tubular, circular knit cover for use with plastic coatings on bowling pins and to an improved method for making such covers.

It has heretofore been proposed to provide a tubular, circular knit, cover, sleeve or skin for the impact area of, or for the entire side wall area of, a bowling pin, the cover being coated with plastic material for strengthening the pin. Such covers have been in the form of a tubular body circular knit from a non-stretchable yarn such as Caprolan nylon with one end looped, or seamed, in the manner of the toe of a stocking to form an end closure for the curved tip of the pin and with the other end having four courses of a non-stretchable spun yarn to minimize fraying when the tubular body is separated or cut off. It has been found, however, that the usual toe seam of such an end closure shows through the hardened plastic coating and that the spun yarn at the other end of the cover creates an undesirable outward flare.

In this invention a resilient stretch yarn is used for the circular knit body of the cover thereby providing a two-way stretch, such yarn being well known in the hosiery trade and termed stretch nylon hereinafter. While the cover of the invention is usable on bowling pins of the candle pin type which have a belly section and flat ends of reduced diameter, it is especially applicable to bowling pins of the ten pin, nine pin or duck pin type, which for convenience will be termed ten pins hereinafter.

Ten pins have a belly section, constituting the major impact area, terminating in a base of reduced diameter and a flat bottom. The belly section merges with a neck of reduced diameter terminating in a tip of slightly increased diameter which in turn has a generally hemispherical upper end wall, or top.

It will be understood that a knit cover must be capable of being slid over the enlarged belly of such pins and must also be capable of tightly hugging not only the belly but also the relatively narrow neck, all without pleats, folds, ruffling, seams or the like to disturb balance, to assume a loose bag-like appearance or to create a ridge in the hardened plastic. Such a cover must also include a symmetrical, seamless end closure capable of smoothly assuming the hemispherical shape of the top of the pin without seams. In addition, it is most desirable that such a cover have a symmetrical, seamless, partial, end closure capable of overlying the flat bottom of the pin to retain the cover in stretched condition on the pin.

The principal object of the invention is to provide a plain knit, seamless, tubular cover, of predetermined dimensions, capable of forming a smooth, meshed skin closely fitting the entire side wall of a bowling pin and having both opposite ends constricted to lie over the opposite end walls of the pin symmetrically and without seams.

Another object of the invention is to provide a bowling pin cover, or skin, circular knit with plain stitches of resilient stretch yarn, the stitches being loose to closely fit the belly of the pin and being tight to closely fit the remaining side wall portions of the pin.

A further object of the invention is to provide a circular, plain knit, tubular, cover of stretch nylon yarn adapted to form a meshed, smooth skin closely hugging the entire side wall of a bowling pin and having an extra yarn laid in with from one to four courses at one end of the tube to serve as a drawstring, the drawstring being pulled tight, knotted and the excess cut off for forming a symmetrical end closure.

Still another object of the invention is to provide a circular knit, tubular cover of stretch nylon yarn adapted to form a meshed smooth skin closely hugging the entire side wall of a bowling pin and having an extra yarn knitted in, under predetermined tension, with about twenty courses at one end of the tube, to form a partial end closure in the form of a rolled rim capable of stretching to slide over the belly of the pin.

A still further object of the invention is to provide an improved method for making a plain knit, straight, tubular cover for a bowling pin wherein an end closure is achieved by haying in a drawstring and a partial closure is secured, at the other end of the tube by knitting in a stretch yarn under tension to form a rolled rim.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawing and from the following description in which:

FIG. 1 is a diagrammatic, fragmentary, elevational view showing the method of making the tubular knit bowling pin cover of the invention.

FIG. 2 is a side elevational view of one of the knit covers, after discharge from a circular knitting machine and before the drawstring end of the tube is closed.

FIG. 3 is a side elevational view of one of the knit covers of the invention closely fitting a bowling pin with the drawstring end of the tube tightened, knotted and the excess laid-in yarn being cut off.

FIG. 4 is a top plan view of the symmetrical end closure of the knit cover closely fitting the curved end wall of a bowling pin.

FIG. 5 is a bottom plan view of the symmetrical partial end closure of the knit cover closely fitting the flat end wall of a bowling pin.

FIG. 6 is a view similar to FIG. 3, on a reduced scale, showing a cover of the invention applied to a candle pin and having constriction means at each opposite end in the form of a laid-in yarn drawstring, and

FIG. 7 is a view similar to FIG. 6 showing a candle pin cover with constriction means at each opposite end in the form of a rolled-over rim.

In the drawing, FIG. 1 illustrates diagrammatically a well known form of circular knitting machine 20, which may be the "Banner" knitting machine made by Hemphill Co. of Pawtucket, Rhode Island, an equivalent machine made by Scott and Williams Co. of Laconia, New Hampshire or any other suitable circular knitting machine of the hosiery type. The machine 20 conventionally includes cylinder needles 21, a needle cylinder of about three and one quarter inches in diameter and pattern mechanism for automatically forming a knit tube of predetermined length and then casting off the tube into a suitable hopper.

Machines of this type conventionally include strand tension mechanism 22, 23 and 24 which may be in the form of a pair of tension plates such as 26 and 27 carried on a rod 28, one plate 26 being spring loaded toward the other plate 27 by the coil spring 29 and the pressure of the spring 29 being adjustable by the set screw clamp 30.

Feed mechanisms 31, 32 and 33 are conventionally provided on machine 20, feed 31 supplying a body yarn for the circular knit tubular body, feed mechanism 32 supplying an extra yarn to be knit in with the body yarn and feed mechanism 33 supplying an extra yarn to be laid in with the body yarn.

It will be understood that the machine 20 is capable of making hosiery in which the hose is a knit tube having a shaped toe section and that the hose is shaped to fit the human foot and leg by a shaped heel section, whereby the resulting product does not have a straight longitudinal axis. However, a bowling pin of the ten pin type bears
little resemblance to the human leg and foot and attempts to use a straight tubular sock as a cover, or skin, for a plastic coated bowling pin have been unsuccessful. The seam line, or loop line, of the toe tends to show through the conventional body yarn has been found to require extreme precision of dimensions while still giving a bag-like effect and conventional extra yarns knitted in to the open end have been found to cause an undesirable flare.

In this invention, the bowling pin cover, skin or sleeve 37 is circular knit, with flat, plain, unribbed stitches, from a body yarn 38 of resilient stretchable material, preferably stretch nylon, whereby the tubular body 39 has a two-way stretch. A knit cover of non-stretch body yarn, because of its knit mesh structure, can be pulled and deformed to assume the shape of the bowling pin 41 but the material tends to bridge across the reduced neck 42 and otherwise be unsatisfactory as a tight fitting skin. The two way stretch cover 37, on the other hand, while of substantially uniform diameter about equal to the diameter of the neck 42 of pin 41 and of less length than the height of pin 41, closely hugs and tightly fits the entire length of the pin. This is for the reason that the body 39 is tight stitched in the axial zone 44 representing about one third of the axial length of the tube and is loose stitched in the axial zone 45, representing the remaining two thirds of the axial length of the tube.

The machine 20 has the capability of automatically shifting from loose to tight stitch in accordance with a predetermined pattern set up on its pattern mechanism. When the tubular body 39 is cast off by machine 20 and inverted, the loose stitch axial zone can be placed over the curved end wall 46 at the top of the tip 47 of pin 41, and then expanded to slide down over the barrel 48 and base 49 to form a loose stitch skin on the belly and base portions of the side wall 43. The tight stitch zone 44 is consequently drawn down over the tip 47 and neck 42 to tightly fit the side wall 43 of the pin in the tip and neck portions.

Preferably the stretch nylon body yarn 38 is about 80 denier or two ply 40 denier to minimize the show-through of the plain stitches in the hardened plastic coating to be placed on the pin 41. Depending on the particular circular knitting machine used, there are preferably about 480 to 520 courses in the tubular body 39 from the first course 54, at one end 52 to the terminal course 54 at the opposite end of the tube.

Ordinarily the last operation of the machine 20, in making hosey, is to form a toe pocket in the terminal courses. The tube is then moved to another machine for closing the toe by looping, with the usual seams and gores to create a stocking or sock shape.

In this invention, construction means 56, for forming the end closure 57 of the cover 37 is formed in the first few courses knit by the machine 20 as shown at the lower end 52 of the tube 39 in FIG. 1. The construction means 56 is an extra yarn 58 laid in to at least one, and up to about four, of the first courses of the tube 39, by the conventional feed mechanism 53. Extra yarn 58 can be of spun yarn but is preferably resilient and stretchable and of the stretch nylon type with a denier of about 210 or of about two ply denier of 70. Yarn 58 must be strong enough to be pulled tight as a drawstring, without breaking, and preferably of a color contrasting to the color of the body yarn in order that the free ends be visible. The free ends 61 and 62 of the extra yarn in yarn 58, are cut off by known mechanism, or manually, and protrude from the body yarn for ready grasp by an operator. It has been found that about two end half, or three, courses of yarn 58 are satisfactory to form the drawstring constrictions 56 which produces the end closure 57.

In this invention, the last operation of machine 20 is to knit in an extra stretch yarn 64, under predetermined tension of the tension mechanism 23, to about the last twenty to twenty-four courses of the tubular body 39. The yarn 64 is preferably of the Spandex type such as "Lyora" made by the Du Pont Company, Wilmington, Del. A bowling pin may be any suitable flexible, resilient, elastomeric, or rubber, or stretch nylon yarn or the like. Preferably yarn 64 is about 280 denier and knitted in under such tension as will cause the upper end 54 of the tubular body 39 to be slightly constricted in diameter after being cast off by the machine 20.

Construction means 66 forms a temporary flexible partial end closure 69 for the cover 37 which is symmetrical, coaxial with the axis of the pin and extends peripherally around the flat end wall 71.

The cover 37 is thus maintained taut and smooth, without seams or pleats, by a snubbing action around the edge of the pin 41 and the pin can stand erect on the rolled rim 67 if desired in subsequent processes. Upon the hardening of a plastic coating on the side wall 43, curved end wall 46 and flat end wall 71, any bunched material at the rolled rim 67 can be cut off to create a smooth, flat face on the bottom of the pin.

As shown in FIG. 3, the tubular body 39 is inverted, preferably pulled inside out, and then slid onto the neck of a pin 41 as a form. At this time the extra yarn 58 is still a loose drawstring with free ends 61 and 62. An operator then pulls the yarn 58 as a drawstring to serve as constriction means 56 at the end 52 of the body 39 opposite to the end 54. The ends 61 and 62 of yarn 58 are pulled until the end 52 of the body closely hugs, and fits over, the curved end wall 46 of the pin and until a circular opening 72, of minute diameter is formed exactly at the longitudinal axis of the cover 37 and of the pin 41. A knot 73 is then tied to complete the symmetrical end closure 57 and the excess yarn is then cut off by a knife, or scissors, 74.

The rolled rim portion 67 is then pulled down over the belly of the pin and into place under the flat end wall 71 of the pin to assure a correct fit. After inspection the cover 37 is then removed over the top of the pin, while simultaneously being again pulled inside out and is then ready for shipment, to be used in the final fabrication of a coated pin with the assurance that it will form fit the same without seams, disturbance of balance, or undesirable show-through.

It should be noted that the extra yarn 58 is laid into tight stitches in the tight stitch zone 44, the shorter stitches of the body yarn being reduced in length by covering the curved end of the bowling pin and thereby reducing the tendency to plead when the drawstring is drawn tight. If yarn 58 were laid into a loose stitch zone, some of the stitches might be drawn over or under adjacent stitches by the action of the drawstring to cause an uneven surface. Tight stitches for the end closure 57 of the cover 37, the tightening of the drawstring merely packs and compresses the stitches together into a smooth surface.

As shown in FIG. 6 a bowling pin 80 of the candle pin type having a belly 81 and opposite flat end walls 82 and 83 may have a cover 84 thereon consisting of a tubular body 85 with a loose, plain stretch axial zone 86, over the belly portion of the side wall 87, and a pair of tight,
plain stitch axial zones 88 and 89 over the remaining portions of the side wall 87. Drawstring constriction means 91 and 92, each identical with constriction means 56, may be used to form a full end closure at each opposite end of the cover 84. The stretch body yarn 93 of the body 85 is thus pulled inwardly radially and smoothly, but not as smoothly as would be the case if the end walls were curved.

As shown in FIG. 7 a candle pin 80 is preferably provided with a cover 95, similar to body 85 but having constriction means 96 and 97, identical with constriction means 66 at each opposite end thereof. The rolled rims 98 and 99 can be cut off after the hardening of the plastic coating to leave a perfectly flat end wall with no show-through whatever of the mesh of the cover 95.

I claim:

1. In a knit cover for a bowling pin of the ten pin type, the combination of:
   a circular knot, plain stitch, seamless, tubular body of stretch nylon yarn having a straight longitudinal axis, having a length less than the height of said pin and having a substantially uniform diameter about equal to the diameter of the neck of said pin, said body including,
   a loose, plain stitch, axial zone adapted to closely fit the body and base of said pin,
   a tight, plain stitch, axial zone adapted to closely fit the neck and tip of said pin, an extra yarn laid in to the last few courses of said body yarn at the outer end of said tight stitch zone, the terminal ends of said yarn being knotted together to define a circular opening of minute diameter and forming a curved, symmetrical, constricted end closure, free of protruding gathers or pleats for smooth and closely fitting the tip end of said pin, and
   an extra resilient stretch yarn knitted in to the last few courses of said body yarn at the outer end of said loose stitch zone, said yarn being tensioned and forming a constricted, symmetrical, partial end closure on said cover terminating in an outwardly rolled rim defining a circular opening of less diameter than the diameter of said body, whereby said rolled rim may be expanded to slip over the tip, neck, belly and base of said pin and then contracts to peripherally fit under the pin base while smoothly drawing, and snubbing the adjacent portion of said cover around the edge of said pin

2. A knit cover as specified in claim 1 wherein said first mentioned extra yarn is laid in to about three courses of said body and said second mentioned extra yarn is knitted in to about twenty-four courses of said body.

3. A knit cover for a bowling pin comprising:
   a tubular, seamless body of predetermined length less than the height of said pin and of substantially uniform diameter, about equal to the diameter of the neck of said pin, circular knit in plain stitches of resilient stretch yarn and adapted to substantially envelop and enclose a bowling pin when stretched thereafter, said body having
   a zone of relatively loose, plain stitches extending about two thirds of the length of said body to one end thereof for closely overlying and fitting the side wall of the belly of said pin,
   a zone of relatively tight, plain stitches extending about one third of the length of said body to the other end thereof for closely overlying and fitting the tip of said pin, and
   constriction means at each opposite end of said body, constricting each said end to a circular opening of less diameter than the diameter of said body,

4. A plain stitch cover as specified in claim 3 wherein said constrictions means at the end of the tight stitch zone of the body comprises
   an extra yarn laid in with at least one, but not more than about five courses of said body yarn proximate said end, said extra yarn being drawn tight, knotted and the excess cut off to form said smooth, symmetrical, seamless end closure on said body for tightly fitting the curved tip end wall of said bowling pin.

5. A plain stitch cover as specified in claim 3 wherein said constriction means at the end of the loose stitch zone of said body comprises
   a drawstring laid in with said body yarn, at said end, said drawstring being knotted at its terminal ends and forming said constricted smooth end closure with its circular opening of minute diameter, and wherein said constriction means at the end of said extra stitch zone of said body comprises
   an extra resilient stretch yarn knitted in with said body yarn at said end, said extra stretch yarn being tensioned to form said constricted, partial end closure and rolled rim at the end of said body, the said circular opening defined thereby being normally of slightly less diameter than the diameter of the flat end wall on said pin but stretchable to slide over the belly portion of said pin.

6. A plain stitch cover as specified in claim 3 wherein said constriction means at the end of the tight stitch zone of said body comprises
   a drawstring laid in with said body yarn, at said end, said drawstring being knotted at its terminal ends and forming said constricted smooth end closure with its circular opening of minute diameter, and wherein said constriction means at the end of said loose stitch zone of said body comprises
   an extra resilient stretch yarn knitted in with said body yarn at said end, said extra stretch yarn being tensioned to form said constricted, partial end closure and its rolled rim defining said circular opening of less diameter to expand and stretch over the belly of said pin.

7. In a straight, tubular, seamless, circular knit, plain stitch cover, adapted to form fit a bowling pin of the type having a curved end wall, the combination of constriction means at one end of said cover comprising:
   an extra yarn laid in with said body yarn, at said end, said extra yarn being tensioned to tightly close said end of said cover except for a circular opening of minute diameter, and wherein said end closure is cut off at said end knot whereby said cover terminates in its entirety at said end opening with no projection beyond said opening, thereby forming a smooth, symmetrical, seamless, end closure adapted to substantially envelop the curved end wall of said pin, said cover being of predetermined length less than the height of said pin and of substantially uniform diameter, about equal to the diameter of the neck of said pin.

8. In a straight, tubular, seamless, circular knit, plain stitch cover, adapted to form fit a bowling pin of the type having a flat end wall, the combination of:
   a cover body of predetermined length less than the height of said pin and of substantially uniform diameter equal to the diameter of the neck of said pin, and
   constriction means at one end of said cover, said means comprising an extra, resilient, stretch yarn knitted in with the courses of the body yarn of said cover, proximate said end, said yarn being tensioned, partially closing the said end of said cover and forming a rolled rim therearound defining a circular opening normally of less diameter than the diameter of
the flat end wall of said pin but said rim being expansible and stretchable to slide over the belly portion of said pin.

9. In combination,
a bowling pin of the ten pin type having a belly portion, a tip portion, a base portion and a flat bottom face,
a tubular, seamless cover of plain stitched, resilient, stretch, body yarn, normally of less length than the height of said pin and of substantially uniform diameter about equal to the diameter of the neck of said pin, said cover being stretched tightly about said pin,
the lower portion of said cover being stretched around the base portion of said pin to overlie the bottom face thereof, and including an extra, knitted-in stretch yarn forming a terminal, out-turned, rolled rim on said body, co-axial with said pin and defining a circular opening of less diameter than that of said face,
said rim being expansible to fit over said belly portion and being symmetrical to permit said pin to stand upright thereon.

10. A combination as specified in claim 9 wherein the upper portion of said cover is stretched over the tip portion of said pin to form an end closure terminating in a circular opening of minute diameter, said body yarn being of reduced bulk in said upper portion to reduce the tendency to pleat therein, and said end closure being smooth and free of pleats, gathers, ribs or other unevenness, likely to show through a relatively thin coating if applied over said pin and cover.

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