(No Model.)

T. H. WORRALL.

NEEDLE CYLINDER FOR CIRCULAR KNITTING MACHINES.

No. 348,088. Patented Aug. 24, 1886.

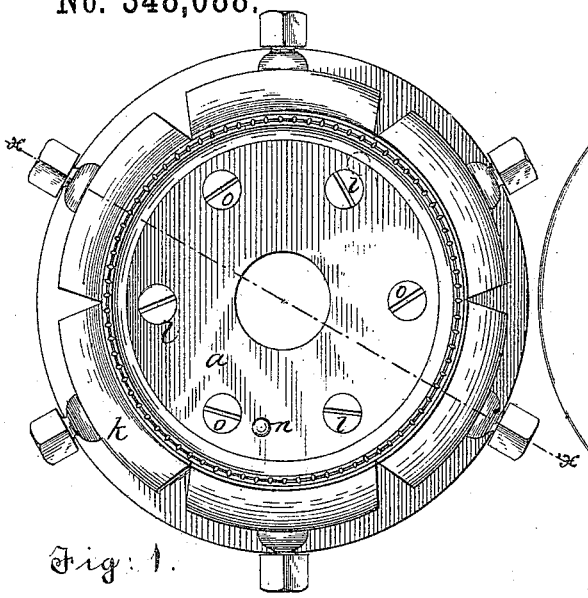

Fig: 1.

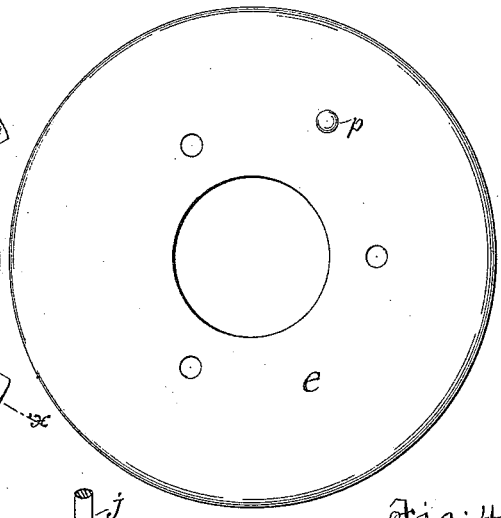

Fig: 4.

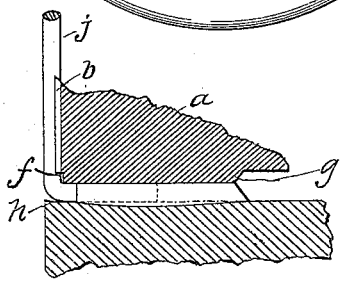

Fig: 6

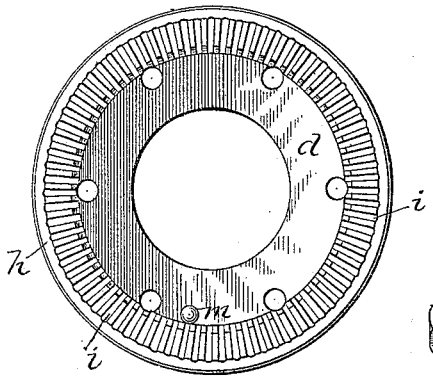

Fig: 3

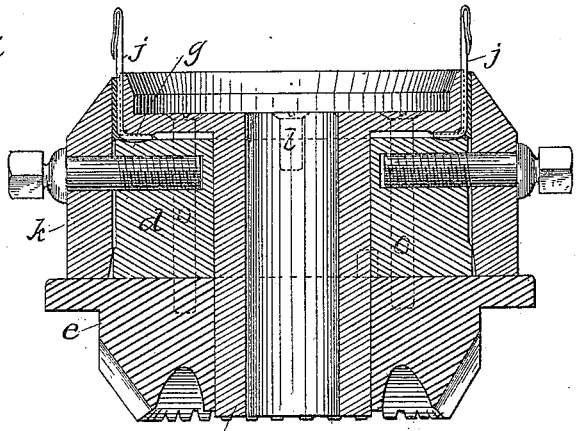

Fig: 2.

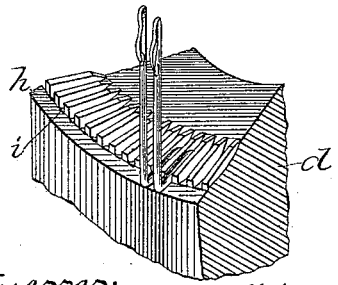

Fig: 5.

Witnesses;
John A. Rennie
H. Brown.

Inventor;
Thomas H. Worrall,
by Wright, Brown & Crosley,
attys.

UNITED STATES PATENT OFFICE.

THOMAS H. WORRALL, OF MEREDITH, NEW HAMPSHIRE.

NEEDLE-CYLINDER FOR CIRCULAR-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 348,088, dated August 24, 1886.

Application filed May 19, 1886. Serial No. 202,634 (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. WORRALL, of Meredith, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvments in Needle-Cylinders for Circular-Knitting Machines, of which the following is a specification.

My invention relates to cylinders or heads for circular-knitting machines.

It is the object of the invention to so improve the construction of what are known as "trick-cylinders" in the class of machines referred to, that the same may be easily and cheaply manufactured, the needles be readily placed and adjusted therewith and be held firmly and true and at a perfectly uniform height, and to effect other improvements calculated to subserve convenience, economy, and perfection in the operation of the parts.

To these ends my invention consists in the improvements which I will now proceed to describe, so that those skilled in the art may make and use the same, the invention being particularly pointed out in the claims hereto appended.

Of the drawings accompanying and forming a part of this specification, Figure 1 represents a top plan view of my improved knitting-head. Fig. 2 represents a vertical central section thereof on the line *x x*, but two needles being shown in position. Fig. 3 represents a top plan view of the body-ring. Fig. 4 represents a top plan view of the base. Fig. 5 represents a detail view of a portion of the body-ring with two needles in position thereon, and Fig. 6 also represents a sectional detail hereinafter referred to.

Similar letters of reference indicate similar parts in all of the figures.

a represents the main cylinder or part, having its periphery tricked or grooved, as at *b*, in the usual manner, for receiving the stems of the needles and maintaining them in a perfectly vertical position. The main cylinder is provided with a long hub, *c*, which extends through and fits snugly in the body-ring *d* and base *e*, as represented in Fig. 2. A groove, *f*, slightly deeper than the grooves *b*, is cut in the periphery of the main cylinder *a*, in the lower edge thereof; and the lower face of said main cylinder is turned down slightly from the hub *c*, outward for a short distance toward the face or periphery of the cylinder, so as to leave a broad shallow flange, *g*, on said lower face of the main cylinder, for a purpose to be presently explained.

Body-ring *d* has a groove, *h*, cut in the upper edge of its periphery of greater depth than groove *f* in main cylinder *a*, and from the hole formed in the body-ring, for the reception of hub *c*, outward toward its periphery, it is turned down, so as to form, in connection with the groove *h*, a broad flange on the upper face of the ring, of the same or slightly less depth or thickness than the shanks or heels of the needles. This flange on the upper face of the body-ring is tricked or grooved regularly and radially, as represented at *i*, to correspond with the size and number of needles it is proposed to employ therein, and these grooves *i* coincide in size and number with the grooves *b* in the periphery of the main cylinder.

As shown in Figs. 2 and 6, the bottoms of the tricks or grooves *i* are preferably curved, being deeper at their centers than their ends, and that within the limits of the flange on the upper face of the body-ring the tricks or grooves *i* are deeper than the thickness of said flange, or, in other words, deeper than the upper face of groove *h*.

j represents the needles, the shanks of which are adapted to extend into the tricks *i* and out into groove *h*, the stems of the needles extending upward in the tricks or grooves formed in the periphery of the main cylinder, in which they are clamped and held by means of the usual clamping-section, *k*. It will now be seen that the shank of the needle is clamped to hold it from moving vertically between the upper face of groove *h* and the lower face of flange *g*, the sides of the tricks or grooves *i* operating on the shank to maintain the hooks or beards of the needles in their proper relative position in the cylinder against torsional strain thereon.

The groove *f*, cut in the lower edge of the periphery of the main cylinder, is simply for the purpose of accommodating the bend or curve in the needles at the junction of their stems and shanks, as will be understood. It is obvious that it would answer the same purpose if the cylinder were slightly beveled, instead of grooved, at *f*.

As is well known to those skilled in the art, it is of supreme importance, in a circular knitting-machine employing spring or beard needles, in order to accomplish perfect work, that the needles should be held and run perfectly true, and be maintained at a uniform height.

While a groove similar to groove *h*, of any desired width or depth, can be readily cut in the face or periphery of a cylinder with the utmost accuracy, it is difficult, if not impossible, to bore a series of holes (as is sometimes done) into the needle-cylinder, or form radial tricks or grooves therein, similar to those formed in the flange on the upper face of the body-ring *d*, which will coincide or register with exactness.

By my invention I am enabled to cheapen the cost of needle-heads of this class or type, by reason of the readiness and ease with which they can be manufactured, and also secure absolute exactness in the height or vertical placement of the needles, the shanks of the latter being held between the upper surface of groove *h* (which is exactly of the depth of the thickness of the needle-shanks) and the lower face of the flange *g*, the stems of the needles being kept firm in the grooves in the periphery of the main cylinder by the shanks of the needles and the sides of the tricks or grooves *i*.

By making the head in three parts, as shown, different-size needle-cylinders can readily be attached to the base *e* and operated from the same driving-shaft.

By providing the main cylinder with a hub *c*, extending through the body-ring and base, perfect steadiness and "truth" in the operation of the parts are secured.

Main cylinder *a* is secured to the body-ring *d* by means of screws *l*, a dowel-pin, *m*, in the latter entering a hole, *n*, in the former to guide the two parts in proper relative position. The main cylinder and body-ring are secured to the base *e* by means of screws *o*, passing down through the cylinder and ring into the base, as shown, a dowel, *p*, in the base entering a hole in the body-ring, for a purpose similar to that just described with reference to dowel-pin *m* and hole *n*. Perfect solidity of the parts, when it is desired, is thus secured.

What I claim is—

1. A knitting-machine-needle head comprising a main cylinder, a body-ring, and a base, the main cylinder being provided with a hub extending through holes formed in the body-ring and base, and the three parts being secured together, substantially as described.

2. A knitting-machine-needle head comprising a main cylinder provided with vertical grooves on its periphery and having an extended hub, a body-ring having a radially tricked or grooved flange on its upper face, and a groove formed in the upper edge of its periphery extending into the outer edge of said tricked or grooved flange, and a base, the hub on the main cylinder extending through holes formed in the body-ring and base, and the three parts suitably secured together, substantially as set forth.

3. The combination, with the main cylinder provided with vertical grooves on its periphery, of the body-ring provided with the radially-tricked flange on its upper face and the groove *h* on the upper edge of its periphery, the needles and clamping-sections, and means for securing the main cylinder to the body-ring and the clamping sections to the latter, substantially as set forth.

4. The combination, with the main cylinder provided with the grooves *b* and flange *g*, of the body-ring provided with the radial tricks or grooves *i* and peripheral groove *h*, the needles *j*, clamping-sections *k*, and means for securing the parts together, as set forth.

5. The combination, with the main cylinder provided with grooves *b*, groove *g*, and extended hub *c*, of the body-ring provided with the radial tricks or grooves *i* and the peripheral groove *h*, the base *e*, needles *j*, clamping-sections *k*, and means for securing the parts together, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of May, 1886.

THOMAS H. WORRALL.

Witnesses:
ARTHUR W. CROSSLEY,
C. F. BROWN.