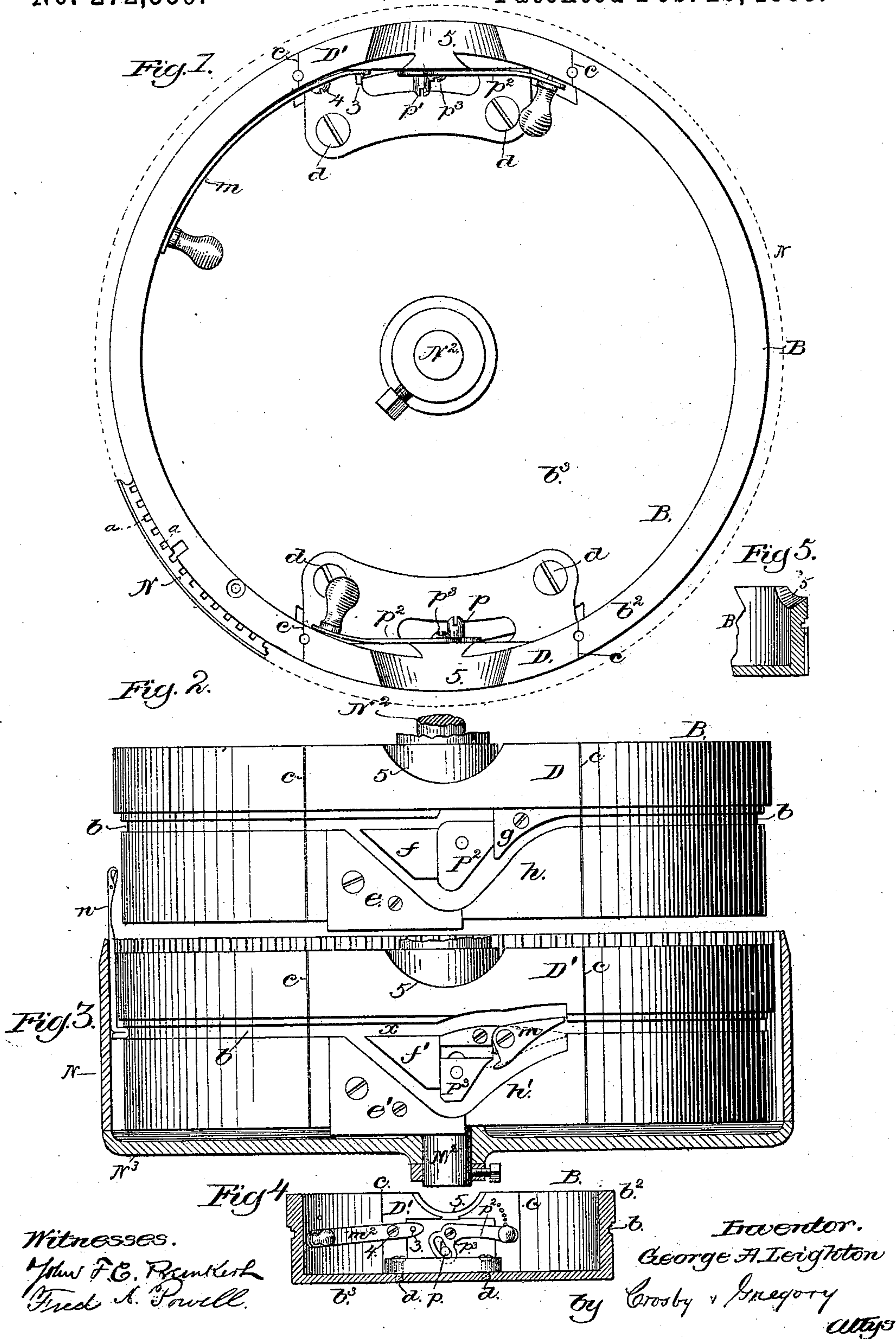


(No Model.)

G. A. LEIGHTON.
CIRCULAR KNITTING MACHINE.

No. 272,559.

Patented Feb. 20, 1883.



UNITED STATES PATENT OFFICE.

GEORGE A. LEIGHTON, OF MANCHESTER, NEW HAMPSHIRE.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 272,559, dated February 20, 1883.

Application filed June 26, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. LEIGHTON, of Manchester, county of Hillsborough, State of New Hampshire, have invented an Improvement in Circular-Knitting Machines, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to that class of knitting-machines known as "circular," and employing latched needles actuated by internal cam-cylinders; and one part of my invention comprehends improvements relating to the cam-cylinder, as will be fully described, and pointed out in the claims at the end of this specification.

In machines of this class referred to the cylinders, or "hubs," as they are sometimes called, have been grooved at their peripheries to receive the butts of the vertical needles, and the cams to actuate the said needles have been screwed directly upon the said hubs. When a needle becomes stuck in the groove of this usual needle-bed, such fact becomes apparent as soon as the cams, in the revolution of the hub, arrive at the needles. A needle so stuck at the cam for actuating it must be removed before the machine can operate, and usually, to remove such needle, it is customary to cut off the work and remove the hub from within the vertical needle-bed, thus necessitating removing all the needles and replacing them and again setting up the work—a very tedious operation, especially in machines having from one to two hundred and upward of vertical needles. To avoid cutting off the work, the loss of the goods so cut off, the loss of time attendant on removing the hub and all the needles, replacing them, and again setting up the work upon the needles, I have made the hub as a hollow shell or pot open at top, and have cut through and removed the vertical wall of the hub sufficiently to receive one or more cylindrical cam-holding segments corresponding in shape with the segments removed from the hub. The cam-holding segments have connected with them the knitting and other cams, so that on the arrival of the cams at a needle stuck in the needle-bed the said segments next to the said stuck needle may be removed, thus enabling the stuck needle to be reached and taken out of the machine without removing

the work or disturbing any of the adjacent needles.

In this class of circular machine as now made, wherein the tops of the hubs are solid, a portion of the hub at its upper end, near and above the line of the knitting-cam, is beveled outwardly to afford a space between the bed and hub to permit the latches of the needles to turn down preparatory to supplying the hooks of the needles with yarn. In such machines, if the latches be broken out of the needles, or the hooks are broken off, the pieces drop into the said space and become jammed between the inner wall of the needle-bed and the outer wall of the cam-hub. This difficulty I also obviate by making the cam-hub hollow at top, and by beveling the upper part of the cylindrical segments backwardly and downwardly below the level of the top of the said hub and of the needle-bed, as shown in the drawings, so that the said pieces of hooks and latches and other refuse will fall into the cam-hub. This inward beveling is also of importance in a machine wherein the cams are not directly attached to segments, but are attached to the wall of an open-top cam-hub. In this instance of my invention I have shown the cam-hub as provided with two sets of knitting-cams, one of which may be thrown into or out of operation at will, as it is desired to knit one or more courses at each rotation of the cam-hub.

Figure 1 represents a plan or top view of one of my improved hollow open-top cam-hubs and part of the needle-bed, it being understood, however, that the portion of the needle-bed shown by dotted lines is or will be the same as shown in full lines. Fig. 2 shows an outside view of the cam-hub and the removable segment containing the main set of knitting-cams. Fig. 3 is a view showing the opposite side of the cam-hub, with the segment containing the secondary set of knitting-cams, which may be made to knit when it is desired to knit two courses at each revolution of the machine, the needle-bed being shown in section, as well as the disk which supports it. Fig. 4 is an inner side view of Fig. 3, but on a smaller scale, it representing the levers for moving or adjusting the cams; and Fig. 5 is a vertical section of one side of a hollow open-top cam-hub, with

cams omitted to show how the top of the wall of the hub may be inclined backwardly above that part of the wall carrying the knitting-cams, such figure being added to illustrate a modification of my invention employed in machines in which the hollow open-top hub is of small size.

The cylindrical needle-bed N (partially shown in Fig. 1) has at its interior proper grooves, *a*, to receive the stems of the usual latched needles *n*, one of which is shown in Fig. 3. This needle-bed will be supported and be prevented from rotating, as described in my application No. 57,112, filed April 8, 1882, to which reference may be had. The shaft N² is the same as that marked with same letter in the said application, and has connected with it, at its lower end, the disk N³, a portion only of which is shown in Fig. 3, to support the needle-bed N. The disk N³ is common to my said application.

My improved cam-hub B, made as a hollow shell or pot, open at top, as in Figs. 1 and 4, will be rotated as described in my said application. The said hub B is grooved at *b*, to receive the butts of the usual latched needles, *n*, as shown in Fig. 3, hold them at the same level, and guide them to their actuating-cams, the latter being shown in Figs. 2 and 3. In Figs. 1 to 4, inclusive, it will be understood that the periphery or vertical wall *b*² of the hub was first cut through on the lines *c*, and that the small segmental portions between the said lines were completely removed. The removal in this manner of portions of the said vertical wall *b*², rising from the bottom plate, *b*³, of the hub, left two open spaces in the said wall. In these spaces I have fitted cam-holding segments D D', each having a foot or flange to rest on the bottom plate, *b*³, of the cam-hub, to which bottom plate the segment is attached by suitable screws, *d*, so that by taking out the said screws the segments D D' may be slid back radially toward the center of the hub to expose the needles between it and the interior of the needle-bed N, in order that any of the needles *n* in the grooves of the said bed may be removed, if desired, and other needles be substituted for them.

The segment D (see Fig. 2) has secured to it the usual knitting-cam, P², and also carries the co-operating cam-pieces and surfaces *efgh*. Cam P³ has a pin, *p*, extended from its rear side backward through a slot in the said segment, where it is acted upon by the slotted end of lever *p*², pivoted at *p*³, (see Fig. 1,) the said lever being just like lever *p*² in Fig. 4. The two like levers *p*² are employed in like manner to adjust the positions of the cam portions P² P³. (Shown in Figs. 2 and 3.)

The segment D' carries cams to actuate the usual needles and knit a second course of loops at each rotation of the hub, if it be desired to knit two courses. Segment D' has cam P³, same in function and purpose as cam P², common to my said application, and has adjacent

cam pieces and surfaces *e' f' h'*, and a pivoted switch, *m*, which, when as in full lines, Fig. 3, will cause the butts of the needles to be drawn down at that side of the hub to knit the second course; but if it be desired that only the cams of the segment D should be operated, then the switch *m* will be placed in its dotted-line position, Fig. 3, when the butts of the needles will enter the space *x* of the segment, and enter the groove *b* at the opposite side of the segment, thus precluding the needles from being drawn down to knit. The switch *m*, pivoted at one end, as shown in Fig. 3, has a pin, 3, projecting from its rear side through a small slot in the said segment, and the said pin (see Fig. 4) is engaged by the end of lever *m*², pivoted at 4, the said lever, by its movement, turning the point of the switch *m* up and down. The upper portions of the segments D D' are cut out and inclined backwardly and downwardly at the point 5, below the line of the top of the cam-hub and of the top of the needle-bed upon which the goods rest when the needles are in their depressed position, so that the latches of the needles when drawn down through their loops may have a free space in which to drop prior to the introduction of yarn into the hooks of the said needles. The surface left by cutting away the upper parts of the segments, as described, open into and incline toward the center of the open top of the hub, and pieces of broken hooks or latches falling therein drop into the interior of the hub, whereas in circular rib knitting machines as heretofore made, the top of the hub being closed, the space in which the latches turned when the needles were drawn down was inclined outwardly, making a pocket or chamber between the outer side of the hub and the inner side of the needle-bed, into which broken pieces of hooks or latches were frequently jammed, to the great injury of the machine.

In small-sized machines for hand-work the movable segments D D' may be omitted and the usual cams be attached directly to the hub; and in such case the top of the wall of the hub may be cut away and inclined backwardly and downwardly, as at 5, Fig. 5, just above the usual knitting-cams, thus improving such machine in the particulars of insuring the passage of pieces of broken hooks and latches into the hub.

It will be understood, if two courses are to be knit at each rotation of the cam-hub, that the needles at each set of cams in operation will be provided with usual yarn-guides by which to deliver yarn to the hooks of the needles.

The upright portions of the segments in line with the walls *b*² of the hub, when these segments are in position, practically constitute portions of the wall of the hub.

I claim—

1. In a circular-knitting machine, a cylindrical needle-bed grooved to contain needles, and a hollow open-top annularly-grooved cam-

hub, combined with a removable cam-holding segment provided with cams or cam-surfaces to actuate the needles placed in the grooves of the bed, whereby a needle stuck in the bed 5 may be removed by simply removing the said segment, substantially as described.

2. The needle-bed and the open-top hollow annularly-grooved cam-hub provided with the two removable cam-holding segments D D', 10 having cams and cam-surfaces, such as shown and described, combined with a switch, *m*, carried by one of the said segments, and with means to move the said switch, whereby the cams of one of the said segments may be made 15 to actuate the needles to knit when it is desired to knit two courses at each rotation of the cam-hub, substantially as described.

3. The grooved needle-bed, combined with

the annularly-grooved cam-hub, and its cam-surfaces to actuate the needles, the said hub 20 being made open at top, and having its wall or portion above the knitting-cams cut away, as shown at 5, to a point below the level of the top of the said cam-hub, and of the level of the top of the needle-bed, on the top of which 25 the knitted goods rest when the needles are in their lowest position, whereby broken pieces of hooks and latches may fall inward into its cam-hub, all substantially as described.

In testimony whereof I have signed my name 30 to this specification in the presence of two subscribing witnesses.

GEO. A. LEIGHTON.

Witnesses:

G. W. GREGORY,
W. H. SIGSTON.