(No Model.)

N. LOMBARD.

CIRCULAR WEAVING MACHINE.

No. 494,108. Patented Mar. 21, 1893.

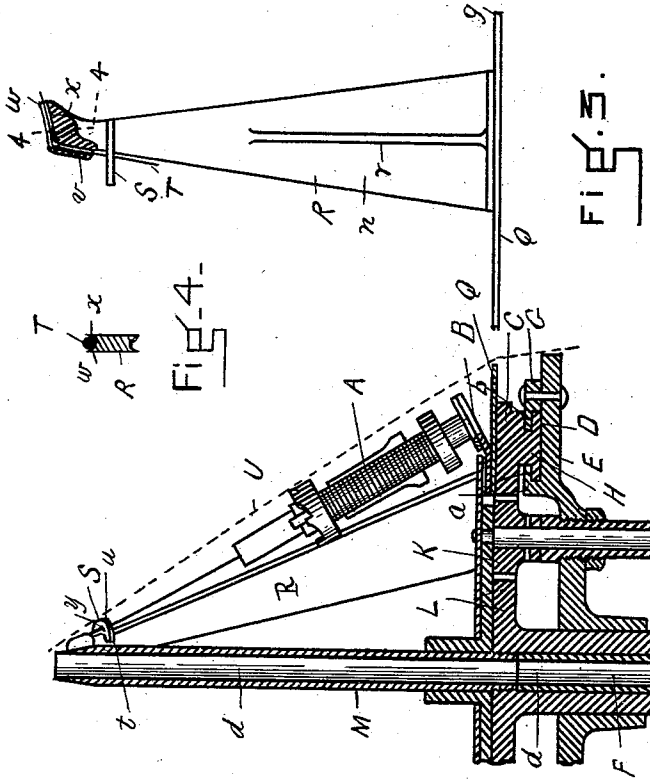

Fig. 3.

Fig. 4.

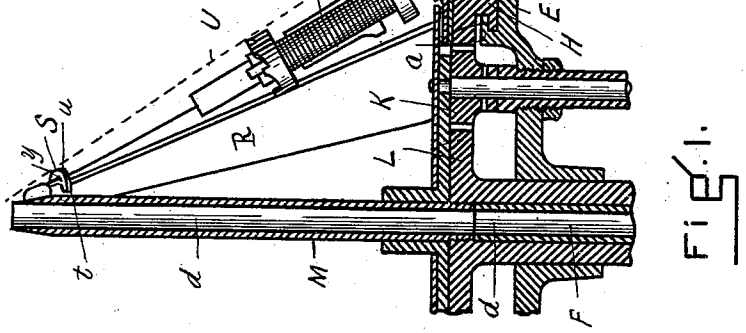

Fig. 1.

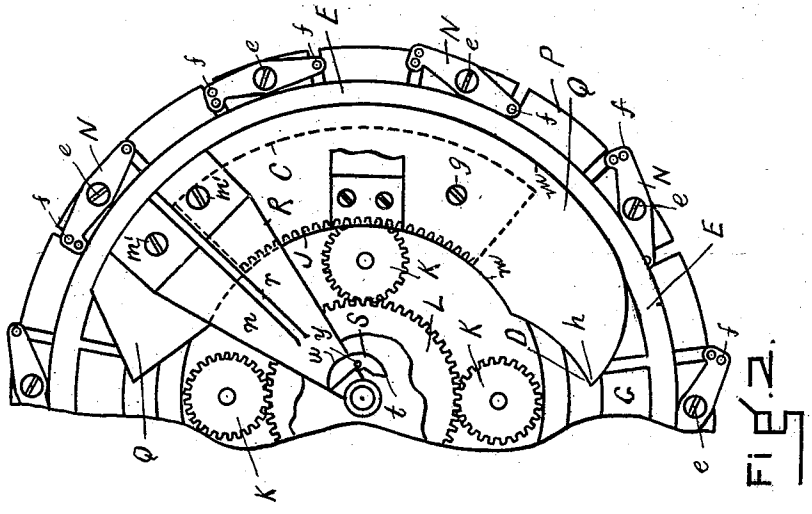

Fig. 2.

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UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HENRY A. CLARK, OF SAME PLACE.

CIRCULAR-WEAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,108, dated March 21, 1893.

Application filed December 31, 1892. Serial No. 456,924. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Circular-Weaving Machines, of which the following is a full, clear, and exact description.

This invention relates to a machine for weaving tubing from fibrous material especially to the machine described and shown in my application for Letters Patent of the United States filed May 11, 1892, Serial No. 432,628, and more particularly to the mechanism connected to the bobbin carrier plate for insuring the separation or opening of the warp threads in forming the shed, for the bobbin carrying the woof thread to pass freely through or between the warp threads, and the invention consists of a certain arrangement of switch plates in combination with the bobbin carrier plate for separating and holding open the warp threads forming the shed for the carrier plate and its bobbin to pass through, all substantially as hereinafter fully described, reference being had to the accompanying sheet of drawings in which

Figure 1 is a detail vertical central section of the machine described and shown in said application with this invention applied thereto. Fig. 2 is a detail plan view of the same. Fig. 3 is a detail front view, and Fig. 4 is a detail vertical section on line 4—4 Fig. 3.

In the drawings A represents a bobbin for the woof thread which bobbin is supported on an arm B secured to a carrier plate C. This carrier plate is in the form of a segment of a flat ring or rim and is arranged to freely travel round in a groove D of a circular recessed plate E, which groove is concentric with a tubular shaft F, the groove being formed by extending lips *a*, *b*, the one *a* by a portion of the plate and the other by blocks G, separated from each other, and secured by screws or bolts to the plate, the carrier plate having on its under side a correspondingly shaped tongue H to freely fit in said groove D.

On the inner edge of the carrier plate C is an internal gear J which is adapted to engage with four gears K, (three only being shown in the drawings,) arranged to turn in suitable bearings, the carrier plate being of a length for its gear J to extend from the center line of one small gear K to the center line of the next or adjacent small gear so that the movement of the carrier plate in the circular groove is made continuous by the engagement of its internal gear with the small gears one after another, the small gears being operated by a central gear L which is connected to other parts of the machine for operation thereof.

Screwing into the center of the central gear L is a vertical tubular rod M, which although independent of the central shaft F forms practically a continuation of the same, so that there is a vertical central passage *d*, which extends through the rod M and the shaft from the top to the bottom. Up through this passage *d* in the operation of the machine the electric wire, or cable, or hose, or other article travels to be covered with the circular woven fabric.

N, N are horizontal levers centrally pivoted at *e* to a plate P below the plate C and in each end of each lever is a hole *f* through which extends a warp thread from a bobbin suitably placed in position below, these levers being connected to mechanism in the machine not herein shown but fully described in said application, for swinging them on their pivots to separate the warp threads to form the shed.

Secured by screws *g* to the upper side of each bobbin carrier plate C is a switch plate Q made of sheet metal having a pointed end *h* and its two edges *m*, *m* extending back therefrom in two circular parallel lines concentric with the tubular shaft more particularly as shown in plan Fig. 2.

The carrier plate has secured to it by screws M′ above the switch plate at the right of the bobbin an upright arm R, which consists of a flat tapering strip *n* having on its outer side a central rib *r*, to stiffen it, the arm lying in an inclined direction toward and close to or bearing by its upper end against the tubular rod M. Attached to the arm at or near its top is another switch plate S but quite small or short and substantially parallel with the lower switch plate, having a pointed end *t* and its

outer edge being curved as shown. The upper end of this arm has a vertical passage *v* at one side through which passes the woof thread T from its bobbin on the carrier plate and its upper edge *w* above such passage extends therefrom slightly rising, as shown in Fig. 3 and it is hollowed or concave in cross section as shown at *x* in Fig. 4. The warp threads from the bobbin pass up through the hole *f* in the levers N to a point near the upper end of the tubular rod M where they are held in any suitable manner or as will be described. The woof thread T from the carrier bobbin passes up through a hole *y* in the switch plate S and then through the hole *v*, in the upper end of the arm lying in the groove *x* in such end and in starting the machine the woof threads, there being two woof threads in said machine, are held by hand until the machine has made one or more revolutions when they are carried along in connection with the warp threads with which they are wove.

The levers N in the operation of the machine are swung on their pivots, alternately moving each end outward and inward and their respective warp threads so that as the pointed end of the switch plates of a bobbin carrier plate arrive at such separated or opened out threads it passes between the threads carrying with it the woof thread of its bobbin which is carried round the upper part of the tubular rod and is wove in and out the warp threads. The upper switch plate insures at the point where the woof threads are delivered and wove with the warp threads that the warp threads shall be open from each other at such place for the arm and carrier plate and bobbin to pass freely through or between them and not interfere with the proper weaving of the tube. As the woof thread leaves the carrier arm, the upward incline of its upper end lays it closely up against the woof thread just above, acting somewhat as a frame in a loom, and also as a feed to the tube as it is woven in the machine, although it is preferable to have the woven tube as it leaves the rod secured to an independent feeding device.

In Fig. 1 the outer warp thread U of the shed is shown in dotted lines.

Having thus described my invention, what I claim is—

1. In a circular weaving machine, a bobbin carrier plate adapted to travel in a circular raceway having attached thereto a switch plate having a pointed end, an inclined arm, a smaller pointed switch plate at its upper end and an eye or passage for a woof thread to pass through it in the upper end of said arm.

2. In a circular weaving machine a bobbin carrier plate adapted to travel in a circular raceway having attached thereto a switch plate having a pointed end, an inclined arm, a smaller pointed switch plate at its upper end, the upper end or edge of the arm being inclined.

3. In a circular weaving machine a bobbin carrier plate adapted to travel in a circular raceway having attached thereto a switch plate having a pointed end, an inclined arm, and a smaller pointed switch plate at its upper end, said arm at its upper end or edge being inclined and grooved along its length.

4. In a circular weaving machine a bobbin carrier plate adapted to travel in a circular raceway having attached thereto a switch plate having a pointed end, an inclined arm, a smaller pointed switch plate at its upper end and an eye or passage for the woof thread to pass through it in the upper end of said arm and its upper end or edge being inclined and grooved along its length.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

NATHANIEL LOMBARD.

Witnesses:
EDWIN W. BROWN,
HENRY A. CLARK.