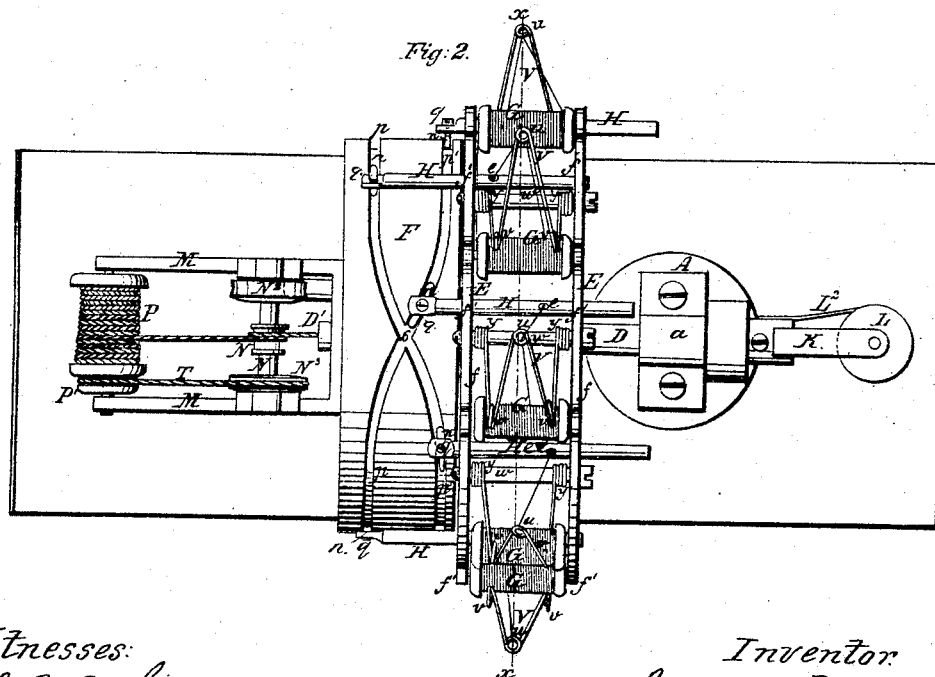
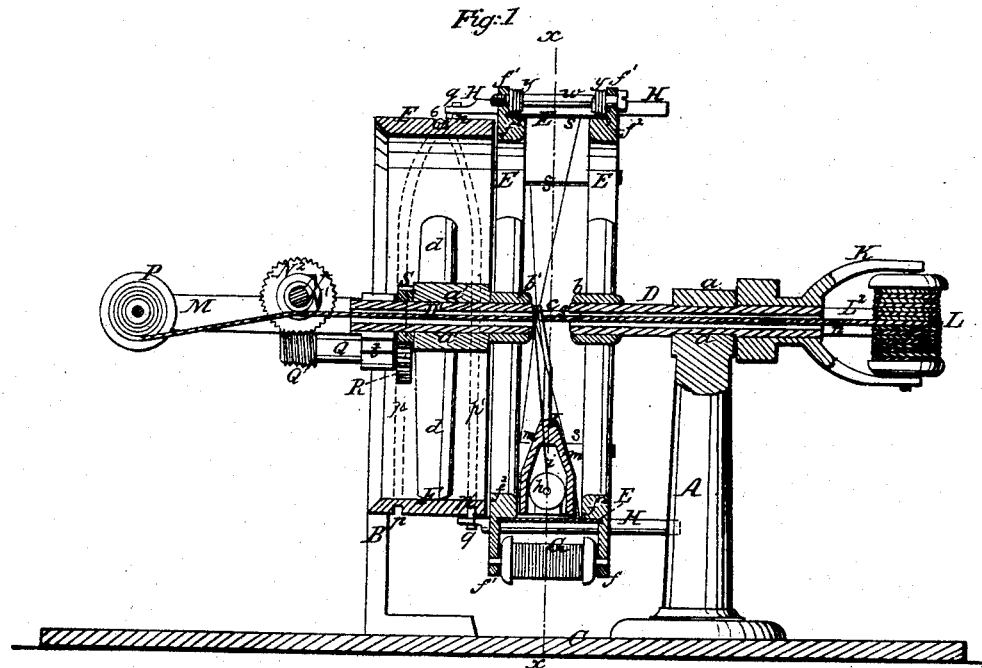


I. E. Palmer *Sheet 1 of 2 Sheets.*
Circular Weaving.

N^o 45,629.

Patented Dec. 27, 1864.



Witnesses:
J. F. Cohen
Geo. W. Reed

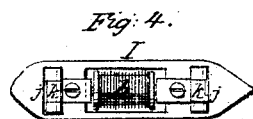
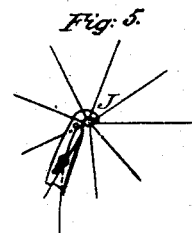
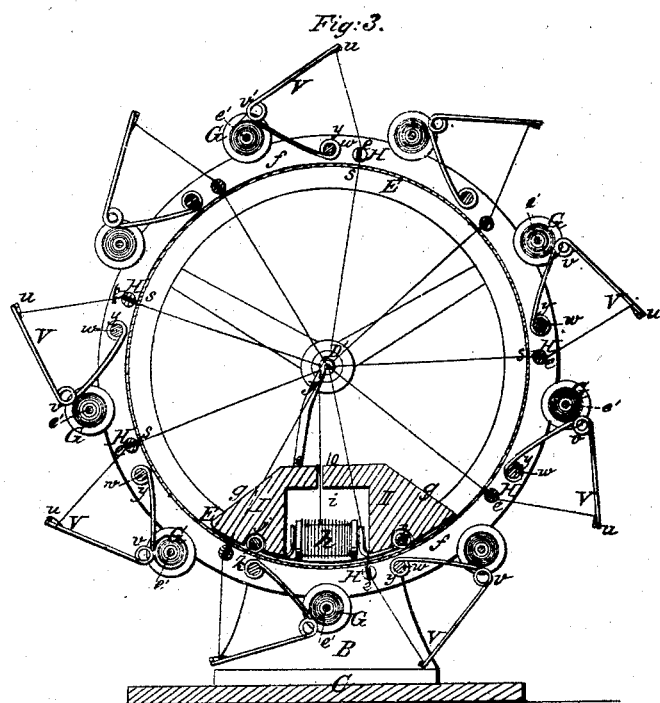
Inventor:
Isaac E. Palmer
per Brown, Coombs & Co.
Attys.

Sheet 2-2 Sheets.

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UNITED STATES PATENT OFFICE.

ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

IMPROVED CIRCULAR LOOM FOR WEAVING THE COVERING OF CORDS, &c.

Specification forming part of Letters Patent No. 45,629, dated December 27, 1864.

To all whom it may concern:

Be it known that I, ISAAC E. PALMER, of Middletown, in the county of Middlesex and State of Connecticut, have invented a new and Improved Machine for Weaving the Covering of Shade-Cord and other Tubular Fabrics; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an axial vertical section of the machine. Fig. 2 is a plan of the same. Fig. 3 is a transverse vertical section of the same in the plane indicated by the line xx in Figs. 1 and 2. Fig. 4 is a view of the under side or sole of the shuttle. Fig. 5 illustrates the action of the device attached to the shuttle to perform the duty of a reed.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists, principally, in the employment, for carrying the warp thread or yarn in a loom or machine for weaving the covering of shade-cord or other tubular fabrics, of a gravitating shuttle kept by its own weight at the bottom of a hollow rotating cylinder, which has its axis in a horizontal position, and which carries a number of bobbins on which are the warp-yarns.

It also consists in the employment, in combination with such rotating cylinder having its axis horizontally arranged, and with the gravitating shuttle, of a series of traversing yarn guides or carriers having a movement parallel with the axis of the said cylinder for the purpose of producing the crossing of the warp yarns, by which, as they revolve with the said rotating cylinder, they are made to receive the weft between them.

It also consists in the employment, for operating the aforesaid yarn guides or carriers, of a stationary cylinder arranged at one end of and concentric with the aforesaid rotating cylinder, and having in its periphery two crossing grooves for the reception of switch-pieces attached to the said traversing yarn guides or carriers.

It also consists in the attachment to such gravitating shuttle of a hook having eyes near the point, and which is made so to conduct the weft into the warp and so to act

upon the warp as to serve the purpose of a reed—viz., to press the weft up closely at the filling-point; and it further consists in a novel system of elastic yarn conductors, applied in combination with the bobbins on the rotating cylinder, and with the aforesaid traversing yarn guides or carriers, for the purpose of regulating and equalizing the tension of the warp-yarns.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A and B are two standards erected upon a bed-plate, C, to support or contain the bearings $a a'$, for the horizontal main shaft D D', of the machine. This shaft is made hollow, and composed of two pieces arranged in line with each other, with a space, c , between them, as shown in Fig. 1.

E is the rotating hollow cylinder, which carries the warp-bobbins G G, and the interior periphery of which forms a track for the gravitating shuttle I. This cylinder is made with two hubs, $b b'$ —one at each end—each hub being connected with the cylinder by a separate set of arms. One of the said hubs is keyed or otherwise firmly secured upon one portion, D, of the shaft, and the other upon the other portion, D', so that the cylinder forms a rigid connection between the two portions of the shaft. On the outer end of the portion D of the shaft there is secured a forked head, K, which contains the bearings for the bobbin L, from which the cord 12 to be covered is supplied. To this head there is attached a spring, L², which presses upon the cord 12 on the said bobbin, and so produces the necessary friction to give the necessary tension on the part which is being covered. To the outer end of the portion D' of the shaft there is secured the frame M of the take-up apparatus, by which the cord is taken up as fast as covered, the cord passing from the bobbin L through both portions of the shaft, and being covered as it passes the space c , before mentioned.

The take-up apparatus consists, principally, of a take-up roll, N, and a collecting-spool, P, both arranged transversely to the shaft D D', and their shafts working in bearings in the sides of the frame M. The shaft N' of the take-up roll is set off so far from the axis

of the hollow shaft D D' that the said roll will receive the cord in a line passing directly through the axis of the latter shaft, as shown in Fig. 1. The said shaft N' has secured to it a worm-gear, N², and a pulley, N³. The worm-gear gears with an endless screw, Q', on one end of a short shaft, Q, which is arranged parallel with the shaft D D' in a suitable bearing, *t*, on the frame M, and on the other end of which there is secured a spur-gear, R, which is caused by the revolution of the shaft D D' to revolve around a stationary spur-gear, S, which is concentric with the latter shaft, but secured firmly to the bearing *a'*. The revolution of the gear R around the stationary gear S causes the former gear and its shaft Q and the endless screw Q' to receive also a rotary motion about their axis, and the endless screw is thus caused to give a rotary motion to the worm-gear N² and the take-up roll. The pulley N³ on the shaft of the take-up roll receives an endless band, T, which also runs on a pulley, P', attached to the collecting-spool P, so that as fast as the cord is taken up by the take-up roll, around which it is given two or more turns, it is delivered to and taken up by the collecting-spool.

The warp bobbins G G are placed on spindles *c' e'*, which are inserted into bearings in lugs *f' f'*, provided on the external flanges, *ff*, of the rotating cylinder E at equal distances apart. These spindles and bobbins are parallel with the shaft D D'. There may be any number of these bobbins.

H H are the traversing yarn guides or carriers by which the crossing of the warp-yarns over the weft is produced. These guides or carriers, which correspond in number with the bobbins, consist of straight rods of a length nearly equal to twice the length of the cylinder, fitted to slide parallel with the axis of the cylinder E through holes provided in the flanges thereof, about midway between the bobbins, and each has drilled through it, at about the middle of its length, an eye, *e*, through which the yarn from one of the bobbins G passes before passing through one of a series of longitudinal slots, *s s*, provided in the cylinder E. The said guides or carriers have each a switch-piece, *n*, pivoted to one end by a pin, *g*, and these switch-pieces are fitted to run freely in the crossing grooves *p p'*, which are cut in the exterior periphery of the stationary cylinder F. This cylinder is arranged around the portion D' of the main shaft of the machine, between the rotating cylinder E and the take-up apparatus, and concentric with the rotating cylinder. It is secured firmly to or forms part of the standard B, and the bearing *a'*, which is supported by the said standard, is constructed in a central hub, which is connected to the shell of the said cylinder by arms *dd*. The two grooves *p p'*, except where they approach and cross each other, extend around the cylinder in planes perpendicular to the axis thereof, and

at a distance apart from center to center equal to the desired length of traverse of the guides or carriers H H, the distance between the points where they commence to converge being about equal to twice the distance between the said guides or carriers, and their point of crossing being one-half the first-mentioned distance; the oblique portions crossing each other at the top of the cylinder, as shown at 6 in the last-mentioned figure.

As the yarn guides or carriers H H revolve with the cylinder, their switch-pieces *n n* pass along the grooves *p p'*, crossing from one groove to the other as they severally pass over the top of the cylinder F, and by thus crossing from one groove to the other the said switch-pieces are made to produce a longitudinal movement of the said guides or carriers, by which the eyes *e e* thereof are caused to move first toward one and then toward the other end of the cylinder E. The said guides or carriers are severally so arranged that when the switch-piece of one is in one of the grooves *p p'* the switch-piece of the other is in the other groove, and by that means one is caused to move in one direction and the next one in the opposite direction, and the warp-yarns are thereby crossed over the weft.

V V are the elastic yarn-guides through which the warp-yarns pass on their way from the bobbins G G to the traversing guides or carriers H H. These guides, which correspond in number with the bobbins, are formed each of a single piece of wire, coiled to form an eye, *u*, at the middle of its length, for the reception of the yarn, and coiled again at *v v*, Figs. 2 and 3, to form two elbows, and coiled again near its ends, as shown at *y y*, around a pin, *w*, which is inserted through and secured rigidly in the flanges *f f* of the cylinder. The ends of the said wire are inserted into holes in the said flanges to prevent the coil *y* from turning freely on the pin *w*. The wire thus formed and secured at its ends forms a double spring, the portions between the end coils, *y*, and elbow-coils *v* forming one spring which presses upon the yarn which is upon one of the bobbins, and thereby produces friction and tension upon the warp-yarns, (which are represented in blue color,) and the portions between the elbow-coils *v* and the eye *u* forming another spring, by which the eye is made to take up the slack of the yarn between it and the filling-point as its respective traversing guide is making the movements by which the crossing of the warp-yarns over the weft is effected. These springs have a peculiar operation, for when any extra tension comes upon the yarn between the filling or weaving point and the eye *u* it tends to draw the eye toward the cylinder, and in so doing tends to draw away from the bobbin the portion of the spring which presses upon it, and so to reduce the pressure and friction upon the bobbin, which is thereby permitted to give off its yarn until the tension between

the eye *u* and the weaving-point is in a certain degree reduced, when the pressure of the spring upon the bobbin is again restored. In this way the proper tension of the warp is regulated.

The "gravitating shuttle" *I*, so termed because it is kept in place and made to operate by gravitation, is made with a curved sole which conforms nearly to the interior of the cylinder *E*. It has its ends beveled on the upper side, as shown at *g g* in Fig. 3, and has its sides beveled upward, as shown at *m m* in Fig. 1, to enable it to pass easily between the warp-yarns. In the middle of its lower part there is a cavity, *i*, for the reception of the bobbin *h*, and between the said cavity and the ends of the shuttle there are two cavities, *j j*, for the reception of two rollers, *k k*, which are held in place by pins or axles passing through them. These rollers project slightly below the face of the sole of the shuttle, that they may bear upon the inner periphery of the cylinder *E*, and keep the sole out of contact therewith. This shuttle may be made of cast-iron, and should be heavy enough to enable it to remain nearly stationary at the bottom of the cylinder while rotary motion is given to the latter. It is fitted loosely between two internal flanges, *f² f²*, provided around the cylinder, and thereby prevented from being displaced laterally.

J is the hook, which is attached to the gravitating shuttle for the purpose of conducting the weft into the warp close to the filling-point, and of so acting upon the warp as to press up the weft, and thereby serve the same purpose as the reed of an ordinary loom. This hook has a straight or slightly-bent stem, which is screwed or otherwise firmly secured into the shuttle. The point of the said hook is flattened in the direction of the axis of the cylinder *E*, and its inner curvature is such that while the rollers of the shuttle bear upon the bottom of the cylinder *E* the hook will hug the cord close up against the inner end of the portion *D'* of the main shaft. The stem of the hook has, at some distance below the curve of the hook proper, an eye, *7*, and, still lower, an eye, *8*. The weft-yarn, passing out of the shuttle at the eye *10* thereof, passes upward and enters the eye *8* on that side of the stem of the hook which is toward the portion *D'* of the main shaft, coming out of the said eye *8* and entering the eye *7* on the opposite side, and coming out of the latter eye on the first mentioned side and being thence delivered between the warp-threads.

To set the machine in operation, the bobbin *L*, containing a piece of cord to be covered, is placed in the head *K*, the cord inserted through the shaft *D D'* and coiled around the take-up roll *N*, and its end secured to the collecting-spool *P*. The warp-yarns from the several bobbins *G G* are conducted through their respective elastic guides *V V*, traversing guides *H H*, and slots *S S*, to the space *c* between the two

portions of the main shaft, and their ends either tied to or coiled once or twice tightly around the cord *12*. The shuttle, having its filling-yarn passed through its eyes *7 8*, so that a short piece projects beyond the upper eye, *7*, is then inserted into the cylinder, and the machine started by applying power in any suitable manner, to produce a rotary motion of the shaft *D D'*.

The revolution of the cord *12*, bobbins *G G*, and warp-yarns with the cylinder *E* while the shuttle remains stationary, or nearly so, and the said yarns are carried back and forth from one end of the cylinder to the other, causes the weft to be unwound from the shuttle and deposited between the warp-yarns, and the warp-yarns to be crossed over it, substantially as in ordinary weaving.

The hook *J*, like the shuttle, passes between the successive warp-yarns, and by hugging the cord *12* is caused to deposit the weft close into the crossings of the warp. The said hook, moreover, passing in front of alternate warp-yarns, as indicated in Fig. 5, where it will be seen that parts of some of the said yarns are dotted to show that they are behind the hook, presses those yarns against the weft which was laid over them on the previous revolution, and so causes them to press up the weft, thus performing a duty substantially like the reed of an ordinary loom.

To adapt the machine to the weaving of tubular fabrics, the portion *D* of the shaft is made solid, and a cylindrical metal core-piece of a diameter equal to that intended for the interior of the fabric is attached thereto, the said core-piece entering some distance into the portion *D* of the shaft, which is made hollow, as represented in the drawings.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The employment, for carrying the weft-yarn in a machine for weaving the covering of shade-cord or other circular or tubular fabric, of a gravitating shuttle, *I*, applied and operating, substantially as herein specified, within a rotating cylinder, which carries the warp-yarns.

2. In combination with the rotating cylinder *E*, having its axis horizontally arranged and carrying the warp-bobbins *G G*, and with the gravitating shuttle *I*, the traversing yarn guides or carriers *H H*, having eyes *e e* provided in them, and applied and operating substantially as and for the purpose herein described.

3. In combination with the said rotating cylinder *E* and the traversing yarn guides or carriers *H H*, the stationary cylinder *F*, arranged at one end of the said rotating cylinder, and having two crossing grooves, *p p'*, in its outer periphery, and the switch-pieces *n n*, or their equivalents, attached to the said guides, the whole operating substantially as and for the purpose herein set forth.

4. The hook *J*, combined with the gravitat-

ing shuttle, substantially as and for the purpose herein specified.

5. The elastic yarn-guides V V, forming double springs and serving the purpose of guiding the warp-yarns from the bobbins to the traversing guides or carriers, that of producing friction upon the bobbins, and that of

taking up any slack of the yarn, substantially as herein described.

ISAAC E. PALMER.

Witnesses:

WALDO P. VINAL,
GIDEON PALMER.