D. AVERY.

Circular-Weaving Loom.

No. 164,250. Patented June 8, 1875.

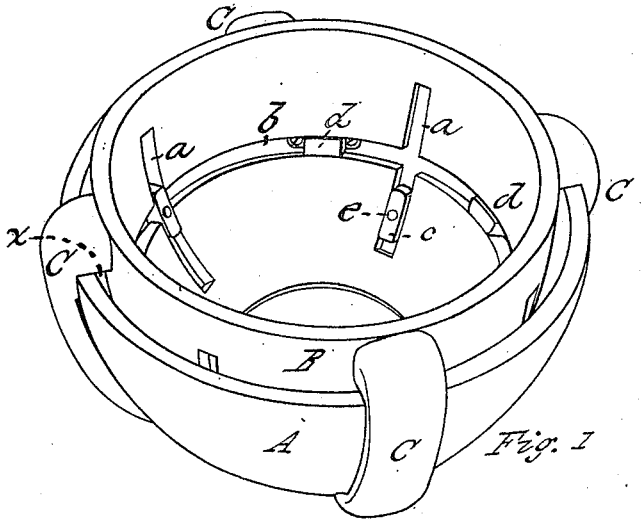

Fig. 1

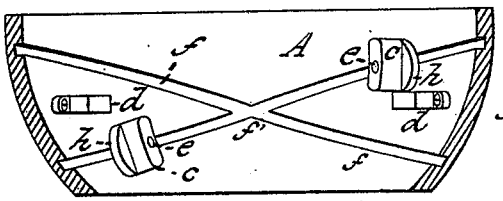

Fig. 3

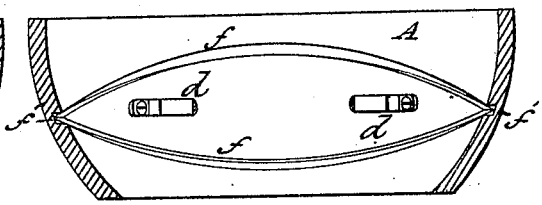

Fig. 2

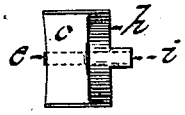

Fig. 5

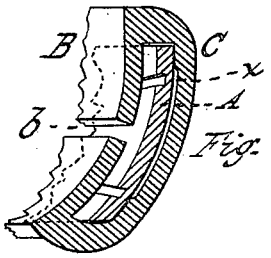

Fig. 4

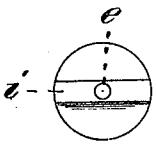

Fig. 6

Witnesses.

J. Thos. Shaw

C. E. Buckland

Inventor

Dexter Avery.

By T. A. Curtis.

his Atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

DEXTER AVERY, OF WESTFIELD, MASSACHUSETTS.

IMPROVEMENT IN CIRCULAR-WEAVING LOOMS.

Specification forming part of Letters Patent No. **164,250**, dated June 8, 1875; application filed July 30, 1874.

To all whom it may concern:

Be it known that I, DEXTER AVERY, of Westfield, in the State of Massachusetts, have invented a new and useful Improved Weaving-Machine for Weaving Tubular Work; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a perspective view of my invention. Fig. 2 is a vertical section through the outer shell at the intersection of the inclined or actuating grooves. Fig. 3 is a vertical section of the same through line H of Fig. 2. Fig. 4 is a vertical section through one of the arms and a portion of the inner and outer shells, to show the manner of supporting the outer shell between the inner shell and the arms. Fig. 5 is a side view of one of the movable holders, designed to hold the bobbins upon which the warp is wound; and Fig. 6 is a rear view of the same.

My invention relates to a machine for weaving tubular or cylindrical work; and it relates more particularly to that class of weaving-machines which are spherical in that portion of their mechanism which actuates the bobbins upon which the warp and filling is wound; and my invention consists of two semi-spherical cases or shells, one placed within the other, the outer shell being supported and held in place by arms attached to the inner one in such manner that the former may revolve freely, and the inner shell is provided with a horizontal groove, in which moves a series of bobbin-holders, secured to the inner surface of the outer shell. The inner shell is also provided with a suitable number of vertical grooves crossing the horizontal groove, in each of which vertical grooves slides a bobbin-holder, which is made movable, and is pivoted to a shoe, which operates or slides in an inclined or spiral groove made in the inner surface of the outer shell; and two or more of these inclined grooves are provided, so as to actuate a sufficient number of the movable bobbin-holders in the vertical guide-grooves made in the inner shell.

In the drawings, A represent a shell, which is spherical in form, but which is open at top and bottom, and which is provided with the inclined or spiral grooves *f*, made on its inner surface, said grooves being two in number, similar in form and inclination, and intersecting each other at the points *f'* at opposite sides of the shell. B represents the inner case or shell, which is divided horizontally by a groove or slot, *b*, and having secured thereto, at top and bottom, the arms C, in each of which is a recess or space, *x*, of sufficient height and width to inclose and support the outer shell A, in such manner that the said shell may revolve freely around the inner shell B. The inner shell B is also provided with a suitable number of vertical slots, *a*, in each of which slides freely a bobbin-holder, *c*, moving in a vertical direction. This bobbin-holder has a flange, *h*, upon its rear end, and a shoe, *i*, is pivoted to the rear part of the bobbin-holder, the latter moving freely upon the pivot *e*. The outer shell A has also a suitable number of bobbin-holders, *d*, secured at proper distances apart on its inner surface, upon which are secured the bobbins holding the filling, and the movable holders *c* are put in place by inserting the shoe *i* into the inclined grooves *f*. The inner shell B is placed inside the outer shell A, and secured properly to the arms C, both at top and bottom, with the ends of the movable bobbin-holders *c* protruding into or through the vertical slots *a* of the inner shell B, the other fixed bobbin-holders, *d*, protruding into or through the horizontal slot *b*, which intersects the vertical slots *a* at about midway their length.

The operation of my invention is as follows: When all the working parts of the machine are in place, as above described, the shoe *i* of each movable bobbin-holder *c* is free to slide along in the inclined groove *f*, and is held in said groove by the inner shell B, which is in a position just in front of the flange *h;* and if the outer shell A be rotated, and the inner shell B remain stationary, or vice versa, the permanent bobbin-holders *d* move around with the shell A in the horizontal slot *b*, and the movable bobbin-holders *c* are prevented from rotating with the outer shell A, and are held in a vertical position by the vertical slots *a*, while the rotary movement of either shell A or B causes the movable bobbin-holders *c* to

slide up and down in the inclined grooves *f*. By placing the permanent bobbin-holders *d*, upon which the filling-bobbins are fixed, at suitable distances apart, and by making the vertical slots *a* at proper distances apart, intersecting the horizontal slot *b*, with the movable bobbin-holders *c*, placed in the vertical slots, it is evident that the holders *c* will be in different relative positions with regard to their height, either above or below their horizontal slot *b*—that is to say, the permanent bobbin-holders *d* may be so arranged with reference to their position and number, and with reference also to the number and position of the vertical slots *a* and the bobbin-holders *c* moving therein, that when the shell A is rotated and the shell B held stationary, any one of the bobbin-holders *c* will move down in its slot *a*, between any two permanent holders, *d*, and will move up between any other two desired holders, *d*, so that if the bobbin-holders *c* are arranged to carry the bobbins containing the warp, and the permanent holders *d* are arranged to carry the bobbins containing the filling, and all the threads are carried to a point near the center of the spherical-shaped shell B, each movable bobbin-holder *c*, with the bobbin of warp thereon, moves up and down in its slot *a*, always at the same distance from the point where the threads are being woven together at the center, and consequently the thread is always taut, and no "take-up" device is necessary; otherwise such a device would be required to keep the threads taut. By this arrangement of the bobbin-holders *c* crossing the path of the horizontally-moving holders *d* at regular intervals, and in substantially a vertical direction, the warp is carried a part of the time above the filling and a part of the time below it, and a process of weaving the goods in a tubular form is carried on at the center of the shell B without any take-up attachment, which is one of the objects of this invention, and another object is to actuate all the warp-bobbins in a vertical direction and all the filling-bobbins in a horizontal direction. The inner shell B may be supported upon a frame or table, and spur-teeth may be made upon either the upper or lower edge of the outer shell A, by means of which, in connection with a toothed wheel, a rotary motion is given to the outer shell A, as in practice I prefer to rotate the outer shell A and hold the inner shell B stationary. The former may be rotated, however, by friction or by any other desirable means.

Having thus described my invention, what I claim as new is—

The shell A, of spherical form in its cross-section, and provided with the grooves *f*, in combination with the slotted shell B, also of spherical form, and the loosely-pivoted bobbin-holders *c*, whereby said bobbin-holders *c* are actuated and guided in a vertical direction, and the bobbin-holders *d* are actuated in a horizontal rotary manner, and all of which said bobbin-holders are always equidistant from the point at which the threads unite to form the fabric, substantially as described.

DEXTER AVERY.

Witnesses:
T. A. CURTIS,
C. E. BUCKLAND.