

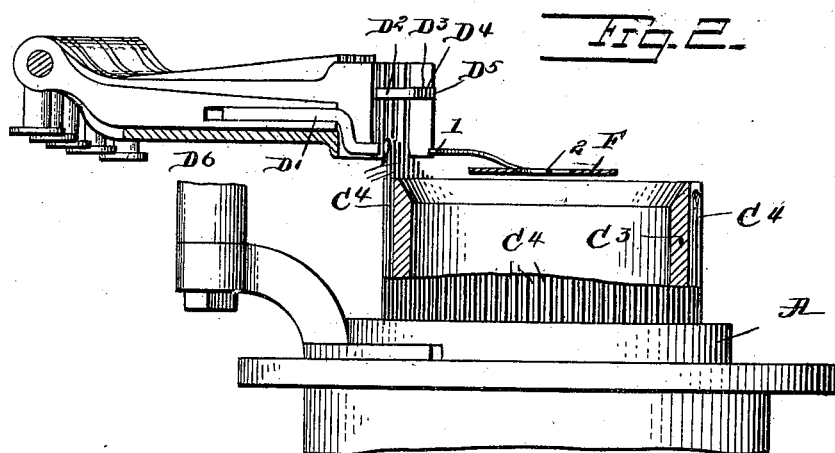
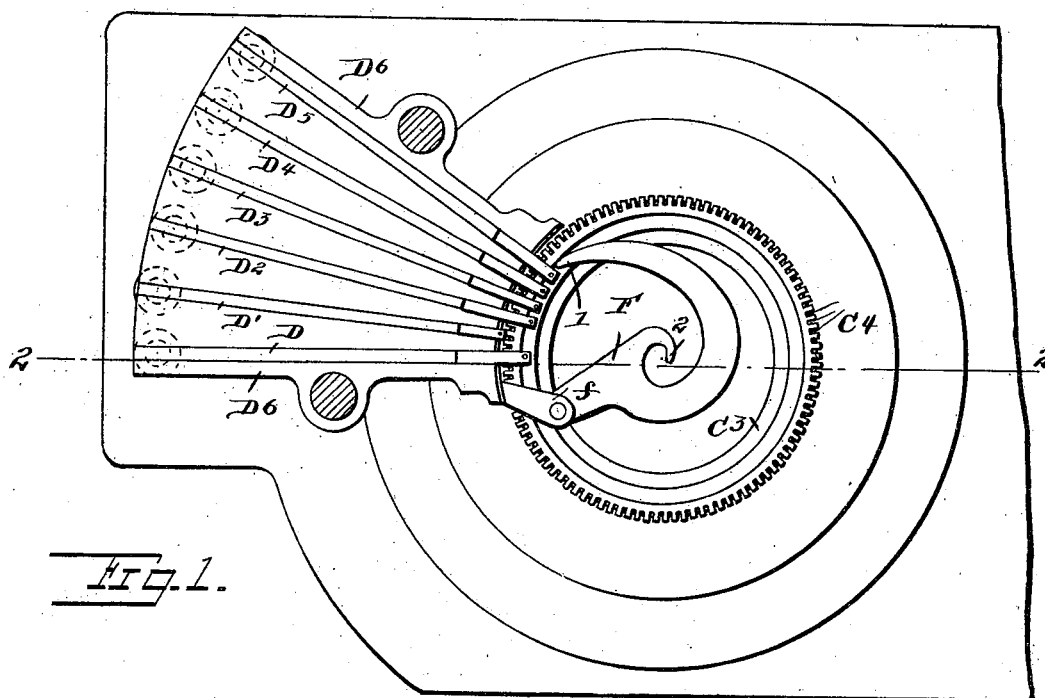
**No. 645,708.**

**Patented Mar. 20, 1900.**

**H. A. HOUSEMAN.**  
**CIRCULAR KNITTING MACHINE.**

(Application filed July 7, 1898.)

(No Model.)



**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

HARRY A. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
THE STANDARD MACHINE COMPANY, OF PENNSYLVANIA.

## CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 645,708, dated March 20, 1900.

Application filed July 7, 1898. Serial No. 685,303. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY A. HOUSEMAN, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Circular-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists in certain improvements in circular-knitting machines designed for making tubular goods, and especially designed to make stockings, and in which a plurality of thread-carriers are used not all of which are in action at the same time.

The improvement, speaking generally, consists in the following: providing for the retention of the idle threads used in the formation of a tubular fabric in which a plurality of threads are used, some of which are at times idle.

I will first describe the embodiment of my invention as illustrated in the accompanying drawings and then point out my invention in the claims.

Figure 1 is a plan view of the needle-cylinder, thread-carrier, and the thread catching and retaining device. Fig. 2 is a partial section on the line 2 2, Fig. 1.

A is the cam-cylinder, which may be operated to rotate and reciprocate in the manner and by the mechanism described in United States Letters Patent issued to me April 30, 1895, No. 538,518.

C<sup>3</sup> is the needle-cylinder, and C<sup>4</sup> the needles in the grooves in the needle-cylinder C<sup>3</sup>.

D D' D<sup>2</sup> D<sup>3</sup> D<sup>4</sup> D<sup>5</sup> are a plurality of thread-carriers, any one of which is adapted to be thrown into operative position and the others out of operative position by mechanism fully described and illustrated in United States Letters Patent No. 640,769, issued to me January 9, 1900. In the drawings the thread-carrier D' is shown in operative position and carriers D, D<sup>2</sup>, D<sup>3</sup>, D<sup>4</sup>, and D<sup>5</sup> out of operative position. As may be seen, in those carriers out of operation the thread end and its thread are out of operative position. In those carriers out of operation the thread end and its

thread are within and above the needles, while the thread end and its thread of the carriers in operation are in line with the needles.

F is a cam having a spiral face, having an inner portion curved upon itself, as at 2, to form a pocket central of the cylinder, having also a free end, and the outer end 1 being in alinement with the thread end and thread of the carriers out of action, while the thread end and thread of the carrier in operation is beyond the outer end of said spiral.

f is a projection from said cam F, which is secured to the thread-carrier support D<sup>6</sup>, and thus the cam revolves with the carriers.

In the operation of the machine any threads which are idle are caught by the end 1 of the cam and moved into the center pocket, the thread being stationary and held fixed on the last loop knitted. When the thread-carrier is again brought into action, the movement of the carrier pulls the thread into alinement with the needles, forming with the first loop formed upon the needles a loop over the portion 2. When this thread-carrier and cam make a revolution, this loop is dropped off the free end of portion 2. By the use of this cam F there is no danger of any loose thread being caught in the needles to the injury of the needles or the detriment of the fabric. The loss of thread is not great, as the only tension after the slack is taken up to pull is the make of the fabric. The loose threads being in the center of the machine or the fabric after taking from the machine may be readily removed without affecting the fabric.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a circular-knitting machine, in combination, a thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, both ends of said spiral face being free, the outer end being in alinement with the thread-carrier when out of action.

2. In a circular-knitting machine, in combination, a thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying with-

in the needle-cylinder, both ends of said spiral face being free, the outer end being in alinement with the thread-carrier when out of action, and means to rotate said cam with the thread-carrier.

3. In a circular-knitting machine, in combination, a thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, both ends of said spiral face being free, one end being in alinement with the thread of the carrier when out of action and the other end being substantially central of the needle-cylinder.

4. In a circular-knitting machine, in combination, a thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, both ends of said spiral face being free, one end being in alinement with the thread of the carrier when out of action and the other end being substantially central of the needle-cylinder, and means to rotate said cam with the thread-carrier.

5. In a circular-knitting machine, in combination, the thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, the outer end of said cam being in alinement with the thread of the carrier when out of action, said cam hav-

ing an inner portion curved upon itself to form a pocket central of the cylinder.

6. In a circular-knitting machine, in combination, the thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, the outer end of said cam being in alinement with the thread of the carrier when out of action, said cam having an inner portion curved upon itself to form a pocket central of the cylinder, and means to rotate said cam with the thread-carrier.

7. In a circular-knitting machine, in combination, a thread-carrier and means to move the thread-carrier in and out of operative position, a cam having a spiral face lying within the needle-cylinder, the outer end being free and in alinement with the thread of the carrier when out of action, and the other end being curved upon itself and terminating in a free end, inclosed by the body of the spiral, whereby a line projecting in any direction from a point on the inner end will intersect the body of the cam, substantially as described.

Signed by me at Philadelphia, Pennsylvania, this 8th day of June, A. D. 1898.

HARRY A. HOUSEMAN.

Witnesses:

GEO. W. REED,  
FRANCES ELLIS.