(No Model.) 2 Sheets—Sheet 1.

T. R. HOUSEMAN.

CIRCULAR KNITTING MACHINE.

No. 470,757. Patented Mar. 15, 1892.

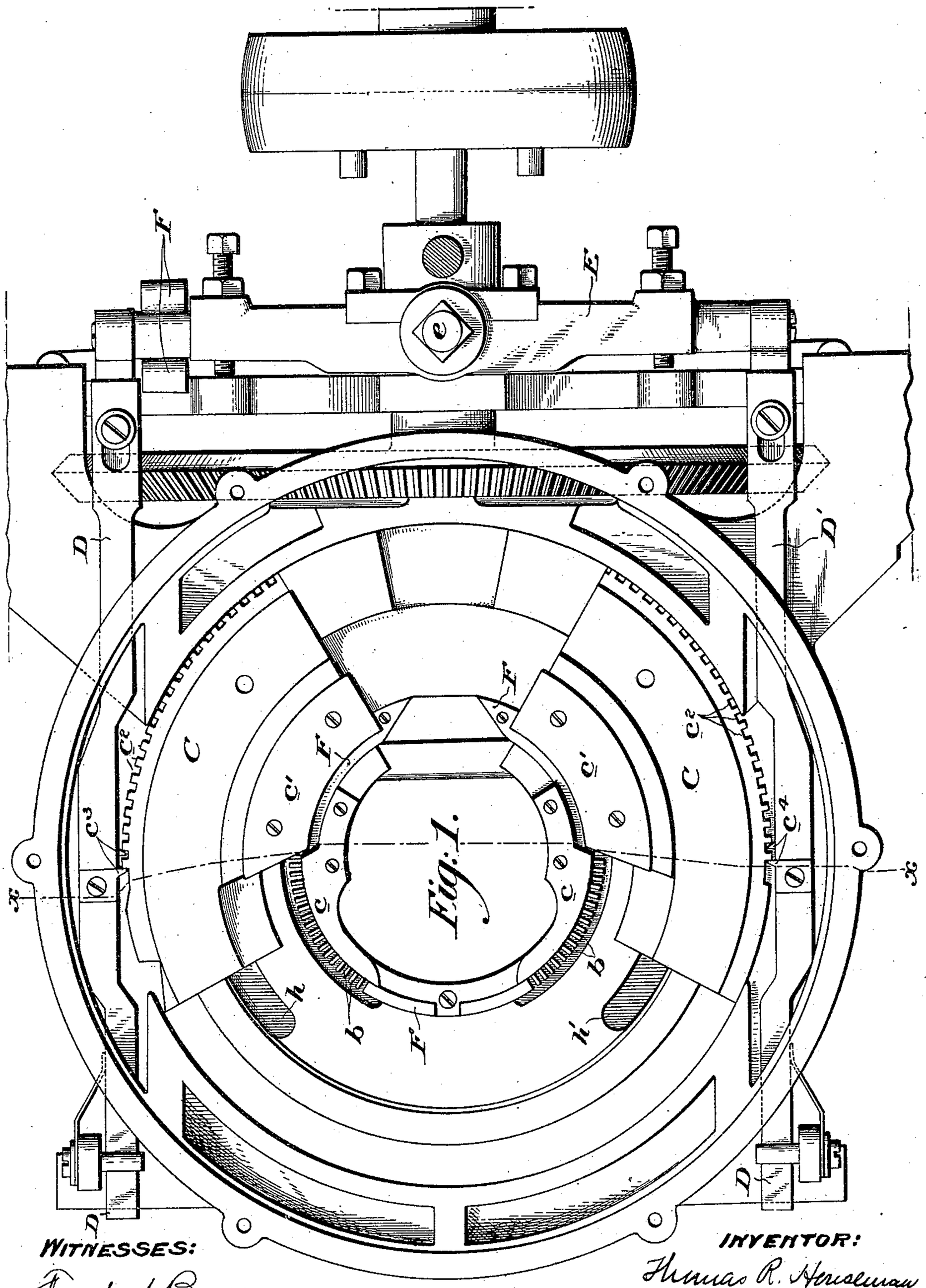

Fig. 1.

WITNESSES:

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H. C. Dunmore.

INVENTOR:

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by his attorney

J. H. Harding

(No Model.) 2 Sheets—Sheet 2.

T. R. HOUSEMAN.

CIRCULAR KNITTING MACHINE.

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Fig. 2.

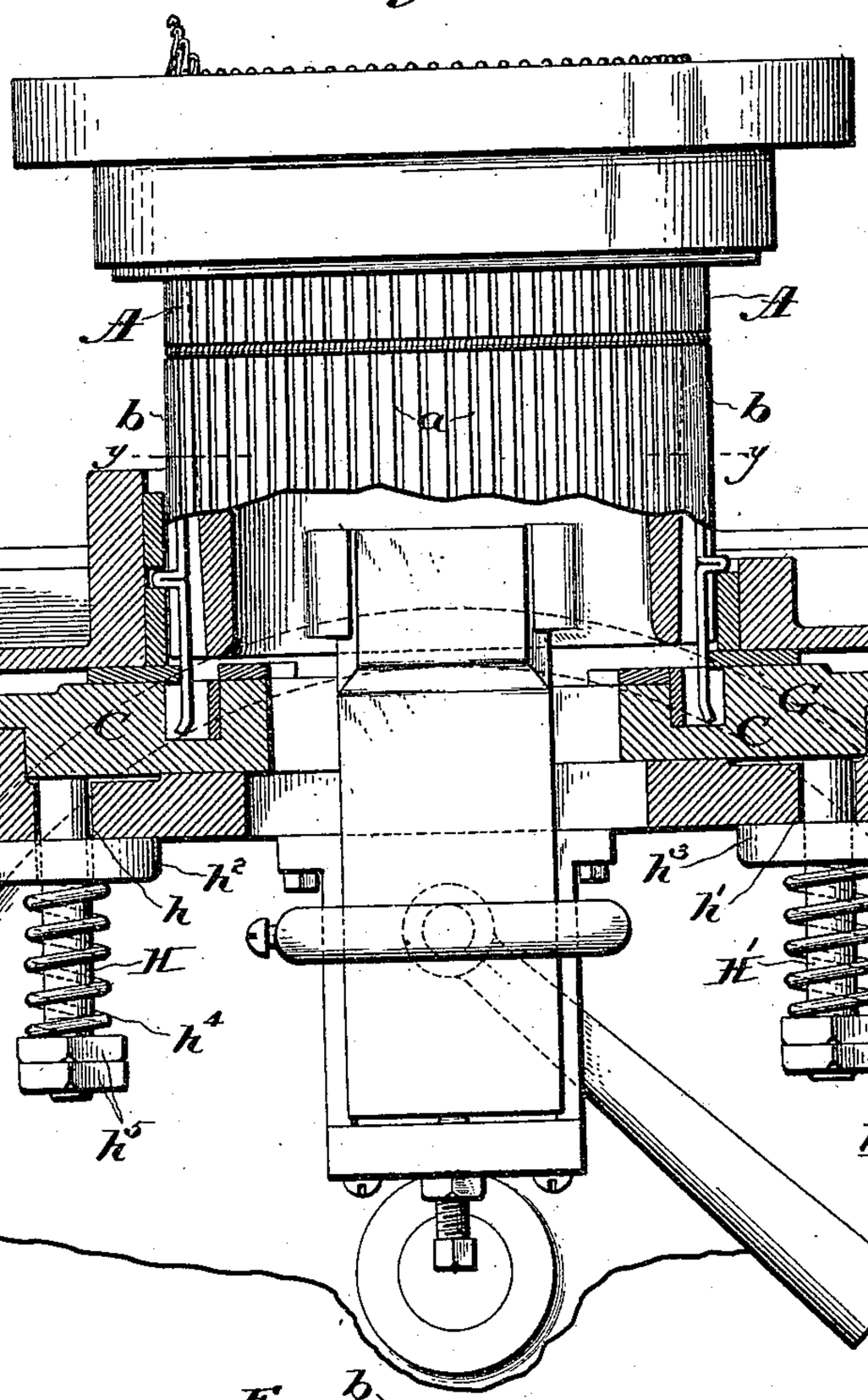


*Fig. 2.**

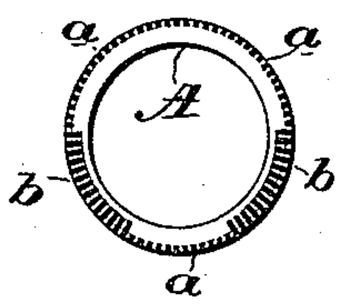


Fig. 3.

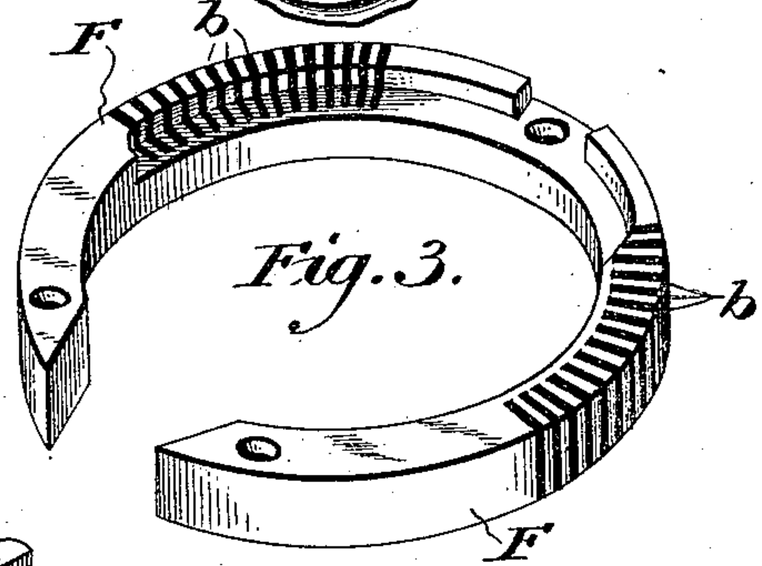


Fig. 4.

Fig. 5.

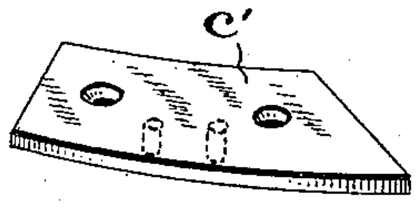
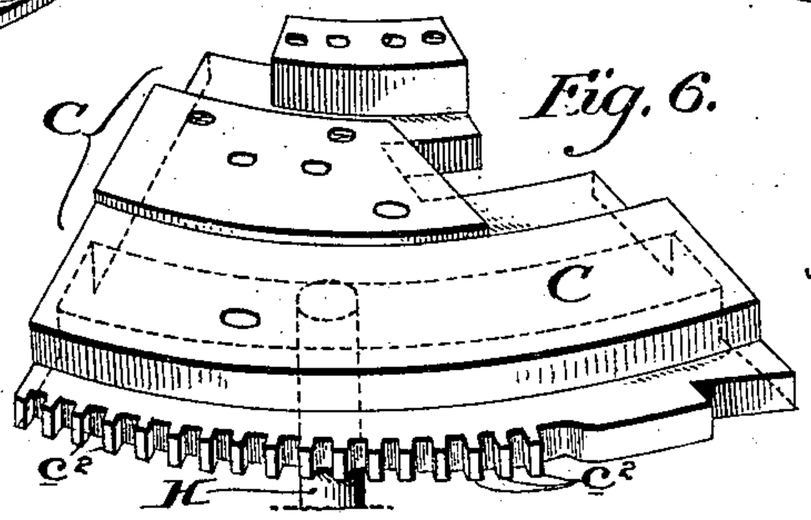


Fig. 6.



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UNITED STATES PATENT OFFICE.

THOMAS R. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 470,757, dated March 15, 1892.

Application filed May 18, 1891. Serial No. 393,067. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. HOUSEMAN, a citizen of the United States, residing at the city and 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 specifically relates to the needle-cylinder appurtenances and mechanism for moving the needles in and out of action, and is an improvement upon certain parts of a machine such as is described in the patent of E. Franck, No. 419,513, dated January 14, 1890, and relates to that part of the mechanism of the machine whereby the tube is narrowed down and widened up, as in forming the heel and toe of a stocking.

In the drawings, Figure 1 is a plan of the machine with cam and needle-cylinder removed. Fig. 2 is a section on line x x, Fig. 1, parts being shown in elevation. Fig. 2* is a reduced section on the line y y, Fig. 2. Fig. 3 is a perspective view of guide-ring. Fig. 4 is a perspective view of one cam-face. Fig. 5 is a perspective view of the other cam-face. Fig. 6 is a perspective view of cam-plate.

Similar letters denote similar parts.

A is the needle-cylinder, provided with slots or grooves a to receive the needles. b are slots or grooves in said cylinder, which are deeper than the slots or grooves a and are adapted to receive the needle to be thrown out of action when forming the heel and toe, so as to be out of the line of action of the needle-cam cylinder.

C C are the cam-plates, provided with the two cam-faces c c', secured to them and provided with the racks c^2. These racks are operated by the pawls c^3 c^4, connected to the arms D D′, respectively, which in turn are connected to shaft E, pivoted at e. This pivoted shaft is caused to vibrate by the arm F, which is connected to suitable mechanism. Thus the cam-plates are driven forward and the cam-faces c c' operate to force the needles to be thrown out of action into the grooves b, one at a time, as is fully described in said Franck patent.

F is a guide-ring, which rests upon the frame of the machine below the needle-cylinder and has slots cut in it corresponding to grooves b, the object of which is fully to support the lower end of the needle when operated upon by the cam. As the needle-cylinder proper provides no support or guide for the lower portion of the needle when the cam-plates C C are operated, either in forcing needles in or out, the needles entering between the cam-faces are liable to become bent, and thus prevent the proper action of the machine. This is particularly true where a large number of stitches to the inch—*i. e.*, a large number of fine needles—are required. By the use of the guide-ring I am enabled to guide the needle at its lower end, as well as at its upper, and the only portion of the needle exposed is between the needle-cylinder and the guide-ring; but as the needle is supported above and below that portion the needle cannot be bent.

The cam-plates C C rest and travel upon the guide G, integral with the bed of the machine, and the cam-plates are provided with stems H H′, which project through slots h and h', respectively, in the bed of the machine, and are provided with washers h^2 h^3, the stems below the washers being surrounded each with a spring.

h^4 h^5 are nuts working on the ends of the stems H H′, respectively, and by means of these nuts I can obtain the desired tension upon the cam-plates, so that there is no over motion, and they remain in the place which the pawls force them, and I can regulate this tension or friction.

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

1. In a circular-knitting machine, the combination of a needle-cylinder provided with grooves, as a, and grooves, as b, and a guide-ring below the needle-cylinder, provided with grooves corresponding in position and depth with said groove b.

2. In a circular-knitting machine, a cam-plate, as C, a guide, as G, upon which said plate rests and travels, a stem attached to said cam-plate, said stem passing through an orifice in the bed of the machine, a washer, as h^2, a spring surrounding said stem, and a nut on the end of said stem.

In testimony of which invention I have hereunto set my hand.

THOMAS R. HOUSEMAN.

Witnesses:
GEO. W. REED,
FRANK S. BUSSER.